

MODERN

November, 1937

Machine Shop

Let's
get to
the
point

SERVICE-PRODUCTION
LOW COSTS



Here are the Facts!

Good grinding is the cheapest thing you can buy—without it many articles would not be made, others would be crude... Good grinding wheels are a necessity to your product... and Sterling Grinding Wheels will do all you ask of them.

THE STERLING
GRINDING WHEEL CO.

Abrasive Division of
The Cleveland Quarries Co.
Factory and Office: TIFFIN,
OHIO • CHICAGO: 912 W.
Washington Blvd. • DETROIT:
101-107 W. Warren Ave.

STERLING ABRASIVES



"LOGAN"

Gives You a
**CENTRIFUGAL
 PUMP WHICH IS
 SELF-PRIMING**



B

ECAUSE it is Self-Priming, The "Logan" Sure Flow is adapted to an unusually wide range of services. It pumps hot or cold liquids; and safely handles chips, filings, abrasives and most corrosive impurities. The "Logan" Sure Flow, with its vertical motor drive, simplifies installation and saves space. It can be mounted entirely away from the source of supply. No part of the pump need be submerged. No foot or check valve is needed in the line.

The "Logan" Sure Flow cuts installation costs, saves valuable space, steps up production and insures greater dependability in the most exacting type of service. Made in ten sizes—4 to 150 gallons per minute. Motor, adapter or belt drive. The new Sure Flow catalog No. 60 will be mailed on request. Write for it today.

LOGANSPORT MACHINE, Inc., Logansport, Indiana

Manufacturers of Air and Hydraulic Devices, Chucks, Cylinders,
 Valves, Presses and Accessories.

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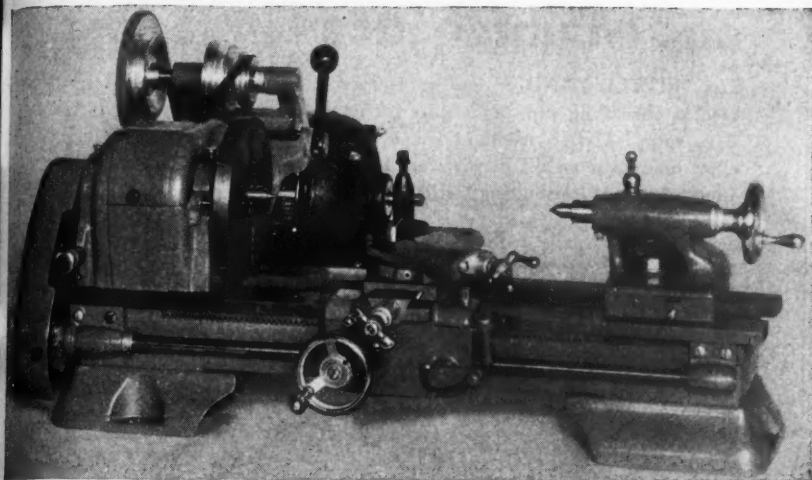
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Another Atlas Bench Lathe Standardized on TIMKEN Bearings



Latest Atlas Bench Lathe. Spindle mounted on TIMKEN Bearings.

Why is it that so many bench lathe manufacturers are swinging to Timken-equipped spindles? A boiled-down answer given by the user of Timken-equipped lathes might run—

"I must have precision lathes to produce a precision product. I don't care to 'bicker' about the accuracy

of one bearing over another. I know that when I specify TIMKEN Bearings on my bench lathe spindles accuracy is assured."

Can you afford to "bicker" about spindle bearings when 95% of all new heavy-duty machine tools have Timken-equipped spindles?

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

Manufacturers of Timken Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; Timken Alloy Steels and Carbon and Alloy Seamless Tubing; Timken Rock Bits; and Timken Fuel Injection Equipment.

TIMKEN

TAPERED ROLLER BEARINGS

Unexcelled for Jobbing and Maintenance Threading

The "LITTLE LANDIS" has no equal for efficient, economical service in threading *pipe* and *bolts* for jobbing or maintenance work. This new LANDIS machine has a built-in gear box to insure efficient operation on all diameters. It employs the patented LANDIS Chaser whose free-cutting action and long life keep tool costs to the minimum.



Write today
for literature

"LITTLE LANDIS"
Pipe Threading and Cutting
Machine

LANDIS MACHINE CO., Inc.

WAYNESBORO, PENNA.

Somewhere IN THE HEALD LINE THERE IS JUST THE MACHINE *for your job.*

WHETHER it is for work with a bore as small as .078" or parts that require a swing of 42", Heald has just the machine designed and built for the job.

Again, regardless of whether you are a manufacturer having the heaviest of mass production where fully automatics are demanded or tool room work with a wide variety of work requiring a very universal tool, a machine from the Heald line can be selected to exactly meet requirements. Look to Heald for Precision Grinding and Precision Boring.

The No. 81 Internal at left is a small machine arranged for high speeds and handles very small to medium size work. It is shown equipped to grind the bores and valve seat of Diesel engine nozzles.

The No. 174 Internal below is a big, powerful gap machine for extra heavy duty and has a swing of 42". The machine shown was arranged for grinding bore, face and O.D. of hot mill shear knives.

DIAM. BORE

.078"

.236"

42"
Swing

THE HEALD MACHINE CO., WORCESTER, MASS., U. S. A.

Up To 30 Times Longer Life

With CARBOLOY Grinder Rests*

Carboly—the extra hard, extra wear-resistant metal will give you long periods of extra life on your centerless grinder rests.

Not only will you get up to 30 times longer life but also greater continuous accuracy, reduced machine down time, lower operating costs, reduced scrap and a higher quality of work.

Write for descriptive leaflet.

CARBOLOY COMPANY, INC.

CHICAGO • CLEVELAND • DETROIT • NEWARK
PITTSBURGH • PHILADELPHIA

CARBOLOY

CENTERLESS GRINDER RESTS

*CARBOLOY-FACED CENTERLESS
GRINDER RESTS.



On one installation reported the life of Carboly rests ranged up to 575,000 pieces per each reconditioning of the rests, as compared to an average of 1,600 pieces per reconditioning with high speed steel.

Send for
Descriptive Leaflet

Carboly Co., Inc., 2975 E. Jefferson, Detroit.
Send free leaflet describing the greater accuracy possible with Carboly-faced grinder rests.

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Published
Entered as

MODERN Machine Shop

HOWARD CAMPBELL, Editor

Volume 10

NOVEMBER, 1937

Number 6

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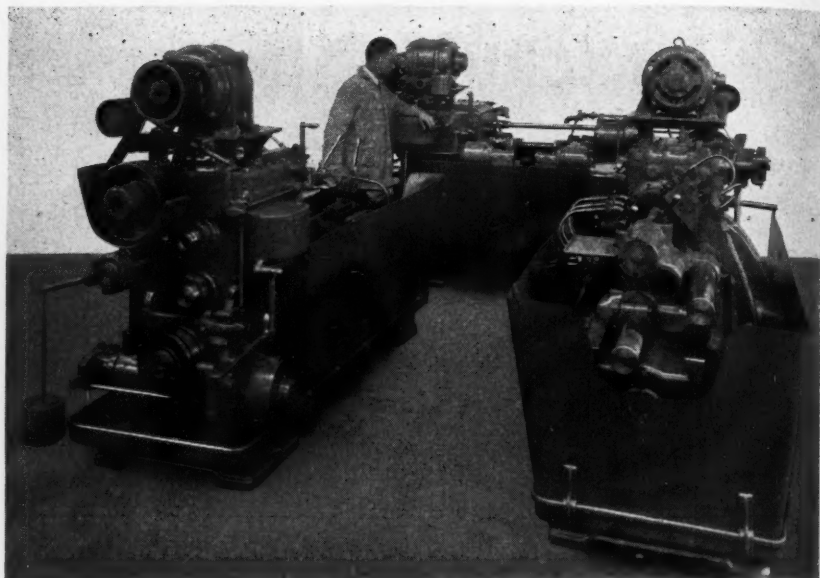
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Published monthly by Gardner Publications, Inc., 431 Main St., Cincinnati, Ohio. Copyrighted.
Entered as third class matter at the postoffice of Columbus, Ohio, under Section 574½ P. L. & R.
and accepted under the act of June 5, 1934, authorized March 11, 1937.

Circulation More Than 28,500 Each Issue



SAVE ONE-HALF

**WITH THE J & L AUTOMATIC DOUBLE END
MILLING AND CENTERING MACHINE**



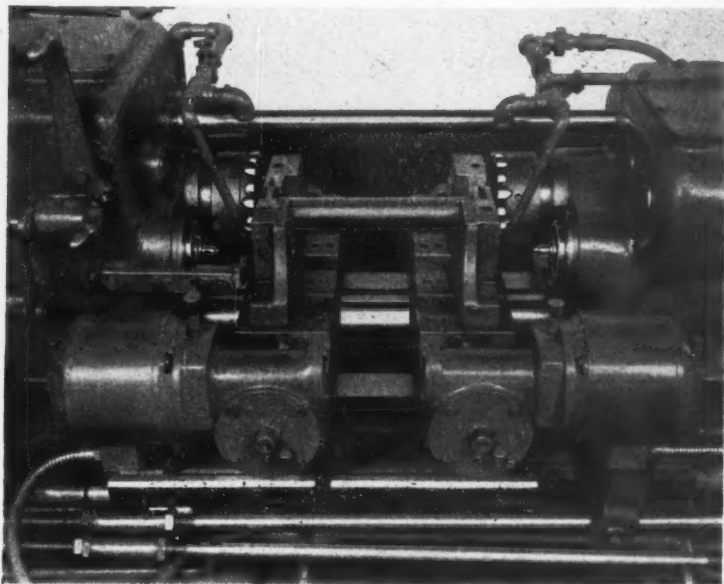
In one automatic cycle, the J&L Automatic Double End Milling and Centering Machine mills bars to length and centers them to uniform depth. This one machine replaces the duplex mill and the double end centering machine, and, when used with a pair of turning machines, one operator can run all three machines. Consider the saving in upkeep, initial investment, floor space, and labor offered by this one machine. An automobile manufacturer is getting outstanding production with his J&L Milling and Centering Machine. One-eighth inch of stock is removed at each end of a bar $1\frac{1}{4}$ inches in diameter. The bar is then centered at both ends. A floor to floor time of 17 seconds is obtained. This is an average production of 1300 pieces per eight hour day.

This machine may be used to advantage on small lots or mass production. May we estimate the profits available to you on a similar job?

JONES AND LAMSON MACHINE COMPANY
Springfield, Vermont, U. S. A.



CLOSE-UP SHOWING MILLING CUTTERS AND CENTERING TOOLS



Increased Production



*Both Centerless
and Center Type
Grinders*

This CINCINNATI Plain Hydraulic Grinding Machine is finish grinding oil rings to a limit of .0005" in eight hours, consistently.

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Production 100%

A STEP-UP in production of 800 to 1700
all rings finish ground to a limit of .0005" in
an 8-hour day—more than 100%.

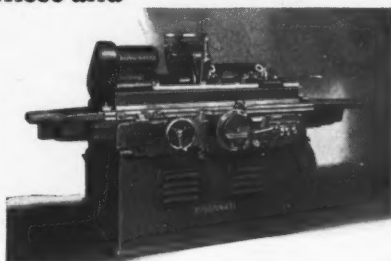
Unusual? Yes, but the CINCINNATI Plain
Hydraulic Grinding Machine is accustomed
to the unusual.

Flexibility... operating convenience... sim-
plicity in setting up... ease of manipula-
tion... separate motions combined into one
(for instance, headstock spindle rotation
and coolant flow both automatically turned
off the instant table is stopped)... these and
other time-saving features are
the answer to increased produc-
tion without extra cost.

Ask for Circular No. G-394. You
will appreciate the informative
data it contains.



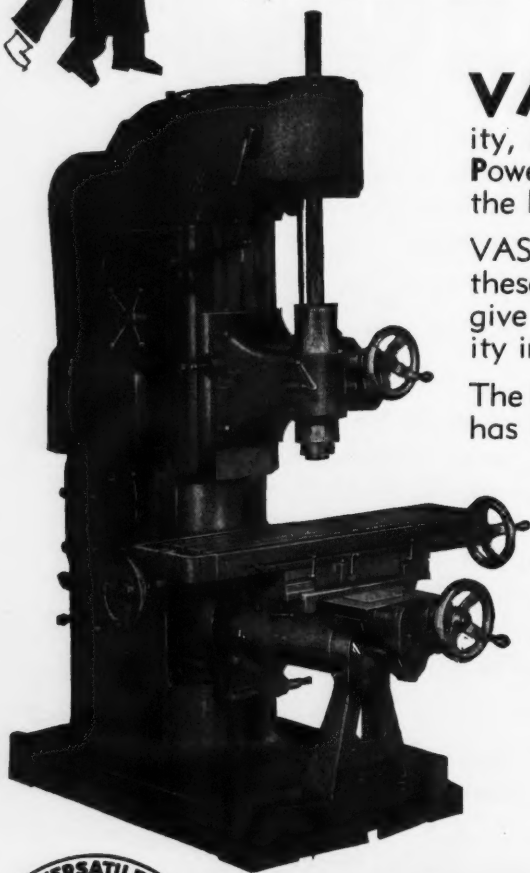
A SYMBOL OF A DEFINITE STANDARD
OF WORTH



CINCINNATI GRINDERS INCORPORATED
CINCINNATI, OHIO, U. S. A.



What is VASP?



VASP is Versatility, Accuracy, Speed and Power—**equally** built into the Knight Miller.

VASP is the **balancing** of these four qualities — to give you the utmost utility in one machine.

The No. 40 Knight Miller: has the **VERSATILITY** to handle a wide range of work—can split thousandths on a job requiring **ACCURACY** — boosts profits on the work calling for **SPEED** — meets the jobs that demand **POWER**.

Write for further information.



W.B. KNIGHT MACHINERY CO.

• ST. LOUIS, MISSOURI •

YELLOW
MAKES
TERS FO
CUTTING

Spur Gear

Helical Ge

Crown Ge

Taper Ge

Interrupte

Gears

Straight

Worms

Hourglass

Worms


Hatchets

Cams

Sprockets

Etc., etc.

GEA



Not only gears, but many parts,
can be cut more accurately and at
lower cost by generating with

Original
FELLOWS CUTTERS

Over 40 years of experience has gone into the making of cutters for producing parts of every conceivable shape and description. Special equipment devoted exclusively to precision grinding of Gear Shaper cutters provides the most complete control over cutter accuracy it is possible to achieve.

Those difficult problems of yours may be easily solved by the Fellows Method. Sending your blueprints implies no obligation, write: The Fellows Gear Shaper Company, Springfield, Vermont — or 616 Fisher Bldg., Detroit, Mich.

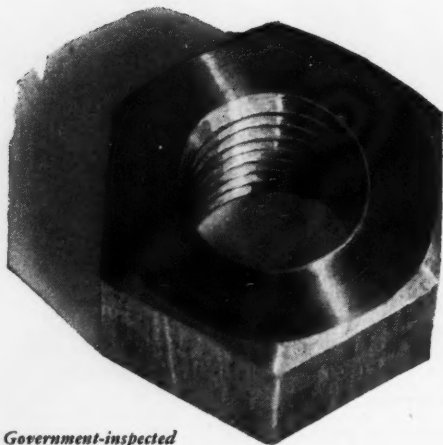
FELLOWS
MAKES CUT-
TERS FOR
CUTTING:

Spur Gears
Helical Gears
Crown Gears
Taper Gears
Interrupted
Gears
Straight
Worms
Hourglass
Worms
Ratchets
Cams
Sprockets
Etc., etc.

FELLOWS

GEAR SHAPERS AND GEAR SHAPER CUTTERS

TAPPING OUTPUT



Government-inspected stainless steel nut, from 4-spindle tapping machine. Prior to use of Texaco Sultex B, only one spindle could be operated, and that at reduced speed.

MANUFACTURERS facing tapping problems in alloy steel will be interested in the experience of the Harrison Bolt & Nut Co., Harrison, N. J. They have more than quadrupled their output . . . simply by changing over to Texaco Sultex Cutting Oil B.

Sultex B could make this enormous increase in output because it gets down between the cutting edge of the tap and the chip, in this way re-

ducing the friction, preventing abrasion, assuring satisfactory finish of each thread.

Attempting to handle this job with another cutting compound, three out of the four spindles were idle, tap breakage was heavy, finish wouldn't pass the necessary Government inspection.

Trained engineers are always available for consultation on the selection and application of Texaco Cutting and Soluble Oils. Prompt deliveries assured through 2070 warehouse plants throughout the United States.

Start using Texaco Sultex Cutting Oil now and increase life of cutting tools.

The Texas Company, 135 East 42nd Street, New York City.

Put new life into your cutting and grinding operations with . . . Texaco Sultex Cutting Oil—A . . . Texaco Sultex Cutting Oil—B . . . Texaco Sultex Cutting Oil—A-2 . . . Texaco Sultex Cutting Oil—C . . . Texaco Soluble Oil—C



TEXACO S

QUADRUPLED!



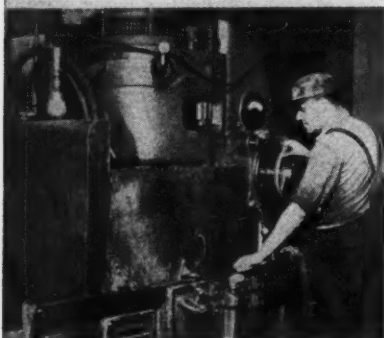
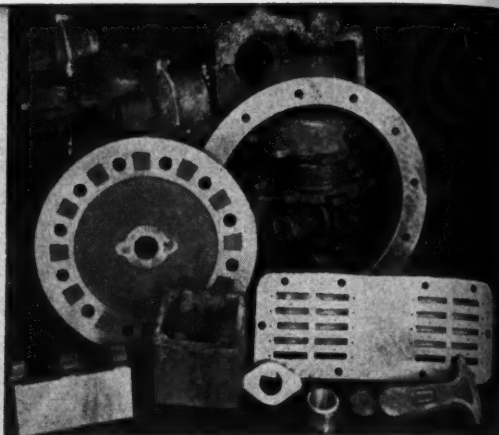
Tapping alloy steel nuts in 4-spindle machine. These nuts must pass Government inspection. Texaco Sultex Cutting Oil B assures this.

SULTEX CUTTING OIL



No. 18 BLANCHARD

FOR HEAVY DIESEL AND GAS ENGINE PARTS



This No. 18 Blanchard Surface Grinder in shop of large manufacturer of Diesel Engines and Gas Engines.

Grinds:

Connecting Rods
Manifolds
Cylinder Head Plates
Diesel Cylinder Heads

Materials are:

Steel Forgings
Semi-steel Castings
Cast Iron

Ground from the rough, $\frac{1}{8}$ " to $\frac{1}{4}$ " stock per surface.

Many pieces are held to $\pm .001$ ".

BLANCHARD MACHINE COMPANY

64 State Street
CAMBRIDGE, MASS.

Best flanged y...
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the equipment f...

SEND FOR
CATALOG O...
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ow Gisholt Cat...
Nos. 3, 4 and...
urret Lathes.





THIS SAVING OF
36%
shows up in
**BIGGER SALES
AND PROFITS!**



These flanged yokes are held to close limits ($\pm .001$ " on the outside rim and on the reamed hole). Both operations are now performed at the same time which was impossible on the equipment formerly used.

GISHOLT TURRET LATHES

Sizes range from 1" to 12" bar capacity—up to 34" chucking capacity

● Here's another concrete case where modern Gisholt equipment cuts a large slice out of production costs and the savings are reflected as greater sales and profits! By installing a new Gisholt 1L High Production Turret Lathe, this well-known manufacturer combined on one

machine, the work formerly done on two other lathes. Equipped with modern Gisholt Standard Tools, the new Gisholt greatly reduced machining time—cut the cost of producing 5,000 each of four different parts from \$3,005 to \$1,907—a saving of \$1098 or 36%.



SEND FOR THIS NEW CATALOG OF SMALL TOOLS

Keep in step with the new improvements that shorten set-up and machining time. Write for your copy of the new Gisholt Catalog of Standard Tools Nos. 3, 4 and 5 Ram Type Universal Turret Lathes.

These features, combined only in Gisholt Turret Lathes, are responsible for this saving

- ★ Heavy, rigid machine construction permits higher cutting speeds and multiple cuts with greater precision and accuracy.
- ★ 12 speed transmission with double-multiple disc clutch for starting and reversing—saves time with direct shifting from forward to reverse.
- ★ Automatic spindle brake stops the spindle quickly

without loss of time—provides faster positioning of fixture for removing or chucking new parts in the machine.

- ★ Power rapid traverse to the tool post carriage (in both directions—cross and longitudinal) quickly brings the cutting tools into position with a minimum loss of time and without physical effort.

- ★ Power rapid traverse to the hexagon turret carriage—both forward and backward.

- ★ Quick indexing and clamping of the square turret tool post saves time in carrying through a cycle of operations.

- ★ Easier, faster operation with simple controls and less effort on the part of the operator.

Now is the time to tool up for reducing manufacturing cost. Why not get full information on these new Gisholts? Write us today.

GISHOLT MACHINE COMPANY

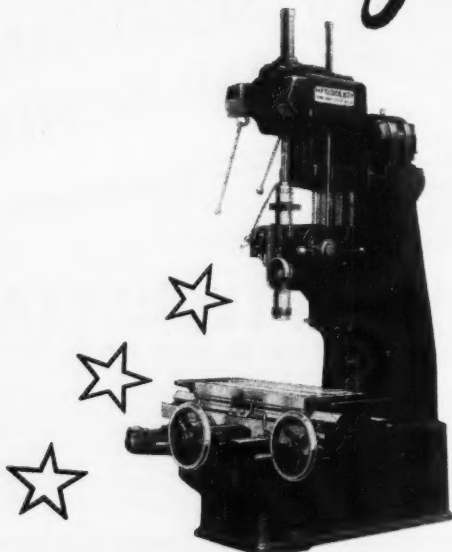
1217 EAST WASHINGTON AVENUE, MADISON, WISCONSIN, U. S. A.
TURRET LATHES • AUTOMATIC LATHES • TOOL GRINDERS • BALANCING MACHINES



NEW!

IN DESIGN • IN CONSTRUCTION

and in price



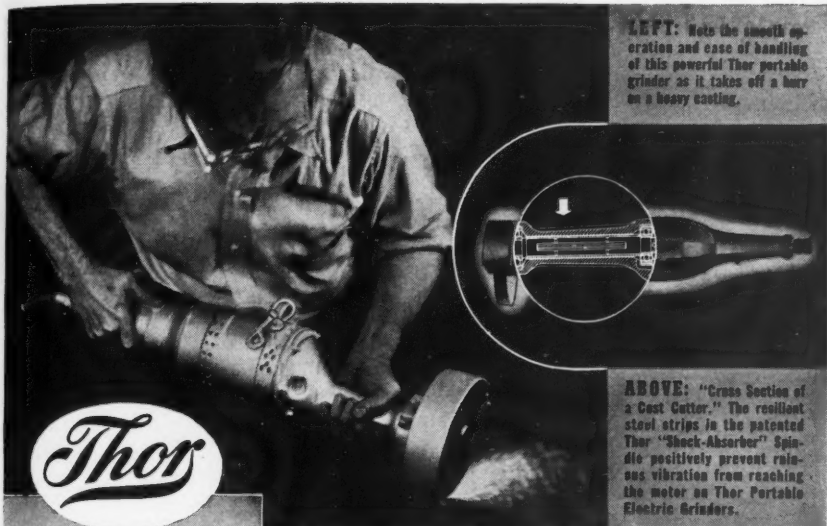
With the FOSDICK Combination Drill and Jig Borer, you can duplicate parts without the aid of jigs. That's economy! The price of this production machine is within reach of practically every metal-working shop.

12 Spindle Speeds from 60 to 1500 R.P.M.—9 Feeds from .0025" to .020"—Spindle Travel 9"—Working Capacity 24" from Spindle to Table—Table 18"x36".

Write today for catalog MSJ.

THE FOSDICK MACHINE TOOL CO.

CINCINNATI, OHIO

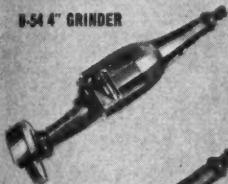


LEFT: Note the smooth operation and ease of handling of this powerful Thor portable grinder as it takes off a burr on a heavy casting.

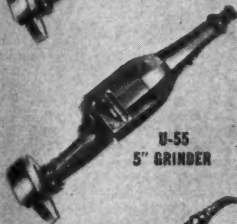
ABOVE: "Cross Section of a Cast Cutter." The resilient steel strips in the patented Thor "Shock-Absorber" Spindle positively prevent useless vibration from reaching the motor on Thor Portable Electric Grinders.

Thor

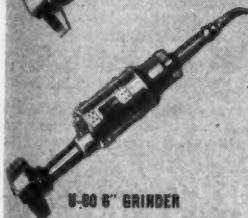
U-54 4" GRINDER



U-55
5" GRINDER



U-80 6" GRINDER



**A THOR GRINDER
FOR EVERY JOB**

THOR VIBRATION-CONTROL SLASHES Grinding Costs

Thor portable electric grinders give you grinding power wherever the job may be! They eliminate costly handling and save hours of non-productive time. In addition, they assure you of dependable, uninterrupted service and low maintenance costs because Thor's Vibration-Control prevents ruinous vibration from causing excessive wear and motor burnouts.

Basic reason for this long life and low upkeep is the patented Thor Shock-Absorber Spindle, a two-piece shaft joined with flexible steel strips, that absorb and STOPS all vibration at the spindle . . . before it reaches the motor! The resilient steel strips — not the motor — take the terrific shocks when these powerful grinders go to work. The result is smooth operation, easy handling, longer life . . . and lower maintenance costs!

The Shock-Absorber Spindle, found only in Thor portable electric grinders, is another example of the improvements Thor engineers are constantly perfecting in their search for ways to increase the life and value of portable electric tools. And portable electric tools, as Thor makes them, are improving operations and cutting costs in thousands of plants. To find out what they could save you, write to:

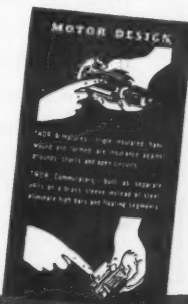
INDEPENDENT PNEUMATIC TOOL CO.
600 WEST JACKSON BOULEVARD • CHICAGO • ILLINOIS
New York Pittsburgh Detroit St. Louis Los Angeles

TOOL MAKERS

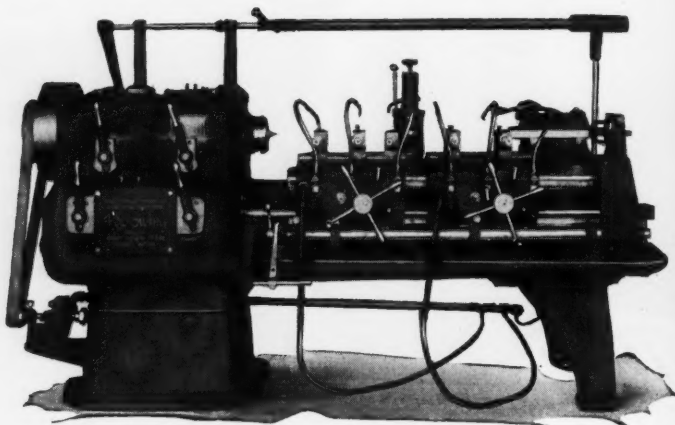
Thor

SINCE 1893

PORTABLE ELECTRIC TOOLS



The OLD CHAMPION is STILL CHAMPION



4" and 8" Lo-Swing LATHES

FLASH!

There are twelve 4" Lo-Swings in the present manufacturing schedule that are available for November and December delivery. Why not get one now and let it start earning money for you?

In the past few years some remarkable lathes have been developed for turning shaft work in large quantities—we have developed a few ourselves. Where large quantities are involved, these machines have made it possible to materially reduce turning costs.

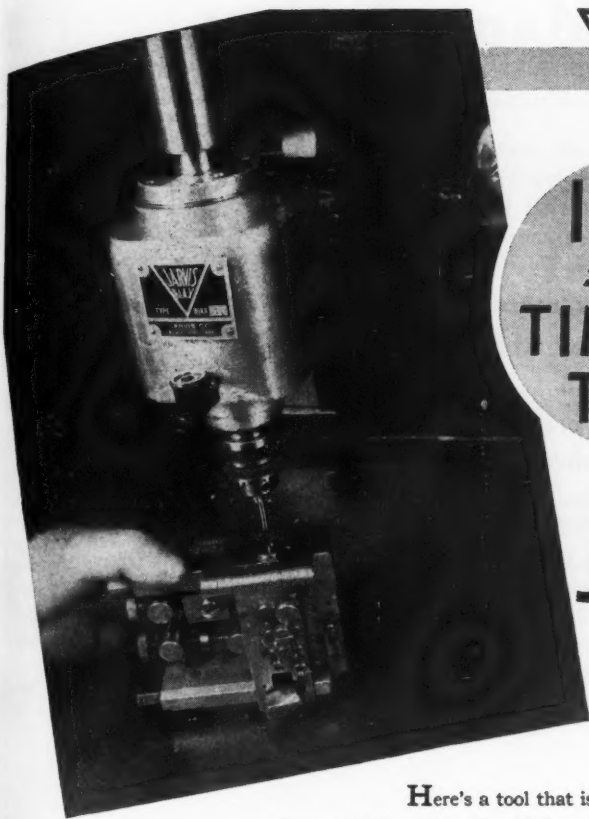
However, when it is necessary to turn shaft work in small and medium size lots, we believe the 4" and 8" Lo-Swing Lathes will produce a lower total cost than any machine available. We are encouraged in this belief, because concerns who have used these machines for years—a great many of them of national importance—continue to place repeat orders with us. Undoubtedly, when these concerns figure turning costs they take into consideration not only the direct labor cost, but also the cost of maintenance, depreciation and interest on the investment—in other words, they figure the total cost.

Since these machines are saving money for others, why not send us blue-prints of some of your shaft work so that we may submit turning estimates for your consideration?

SENECA FALLS MACHINE CO.
310 FALLS ST., SENECA FALLS, N. Y.

TURNING ECONOMIES BEGIN WITH A LO-SWING PROPOSAL





IBM
saves
TIME *and*
TAPS

with
JARVIS
Tappers

Here's a tool that is practically indispensable to most high production drilling and tapping departments. The BIAAX TAPPER steps up production, taps more holes between grinds and actually makes broken tap loss almost nil.

The JARVIS BIAAX above was photographed "in action" in the drilling department at the International Business Machines plant.

Let us tell you more about this and other models of BIAAX TAPPERS . . . you'll find our bulletins most helpful. There is a Jarvis Tapper to fill your requirements. There is a size to fit your work.

Send for your copy — today.

THE CHARLES L. JARVIS COMPANY

Jarvis Tapping Attachments, Power Screw Drivers, Flexible Shaft Machines, Flexible Shafts and Rotary Files

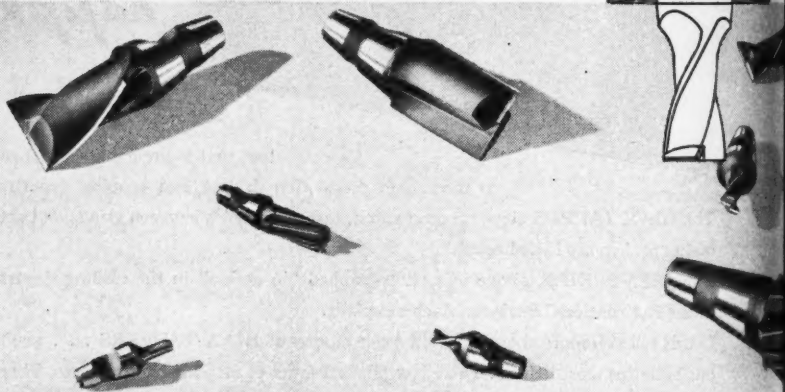
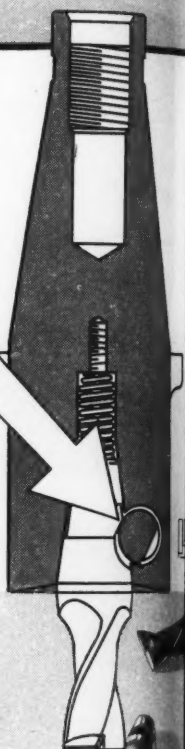
MIDDLETOWN, CONN.

This Simple Device Saves Many Dollars

By actual stop watch tests "Cam Lock" End Mills reduce the time required to change mills by more than half, and they have the following exclusive advantages:

1. End Mill is securely locked in taper.
2. Quick release — there is no fussing with a sticking End Mill.
3. The positive lock prevents End Mill from being pulled out, either by the cut or by vibration.

Specify Brown & Sharpe "Cam Lock" End Mills and Equipment. They make possible high production rates and provide real savings. Through the use of Adapters, "Cam Lock" Equipment also accommodates Shell End Mills, Straight Shank End Mills, Angular Cutters and certain hole-type cutters. Ask for Catalog No. 32. Brown & Sharpe Mfg. Co., Providence, R. I., U. S. A.



BROWN & SHARPE CUTTERS

HARDINGE

when you want collets

in a hurry!

ORDER FROM THIS BOOKLET

COPIES SENT FREE TO EXECUTIVES IN CHARGE OF PRODUCTION, STOCKROOM, PURCHASING, AND ENGINEERING DEPT'S.

—ASK FOR BULLETIN No. 37A—



SINCE 1890 HARDINGE Collets have stood for greater accuracy, durability and dependability. There are complete stocks in Elmira, New York, Detroit, Chicago and Los Angeles ready for immediate shipment for use with these lathes and millers:

American, Ames, Boye & Emmes, Carroll & Jamieson, Chard, Cincinnati, Cisco, Dalton, Flather, Greaves-Klusman, Hamilton, Hendey, LeBlond, Monarch, Porter-Cable, Pratt & Whitney, Rahn-Larmon, Reed-Prentice, Rivett, Rockford, Sebastian, Seneca, Sidney, South Bend, Springfield, Stark, Sundstrand and our own Hardinge Cataract Lathes.

Ames, Becker, Burke, Pratt & Whitney, Reed-Prentice, Rockford, Stark, Sundstrand, Van Norman and our own Hardinge Cataract Millers.

HARDINGE BROTHERS, INC. - ELMIRA, NEW, YORK

AMERICAN BROACHES

For Any Practical Broaching Operation



American Broaching Service is complete . . . has nation-wide representation . . . creates machines, broaches, fixtures; separately or as complete units; for any practical broaching operation.



Large or small, round, flat, or any other shape; simple, complex, or combination, push or pull types, one piece or sectional, with straight or spiral teeth—American Broaches can be obtained for any practical broaching operation. And they are good broaches—accurate, durable, economical. There are many reasons for this. Our personnel is thoroughly experienced in broaching practice from pioneer days right up to this minute. Our mechanical equipment is complete and includes many brand new

standard machine tools in addition to special machines and fixtures of our own design and construction. Our shop is manned by broaching specialists so expert in working rapidly to close limits that they turn in every job secure in the knowledge that it will pass our rigid inspections. Result—American Broaches for any practical broaching operation must be reliably accurate, durable, economical. Specify "American" in your next order for broaches and judge their qualities yourself.

AMERICAN BROACH & MACHINE COMPANY, Ann Arbor, Michigan, U. S. A.

BROACHING MACHINES, PRESSES, BROACHING TOOLS, SPECIAL MACHINERY

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COULD WE BE CALLED IMMODEST?

the above scene suggests that "What Makes Main Street" is responsible for this conference, please forgive us. The idea we wish to convey is that this new book by LeBlond contains plenty of meat for a meeting of minds on the important subject of lathes. • Between its covers, executives close to production problems will find a comparative panorama of facts. It is designed to sweep away the cobwebs of confusion and point the mind to salient reasons why LeBlond Lathes are the key to a faster, simpler cost-downing production. • The tempo of Main Street is the tempo of the lathes that serve its progress. "What Makes Main Street" reveals for the first time the real meaning of this world artery of production . . . where LeBlond Lathes have played a vital part for fifty years.

No conference required to get a copy. Simply send a quarter of a dollar via the coupon—it will come back with interest if we've overestimated its interest to you!!!

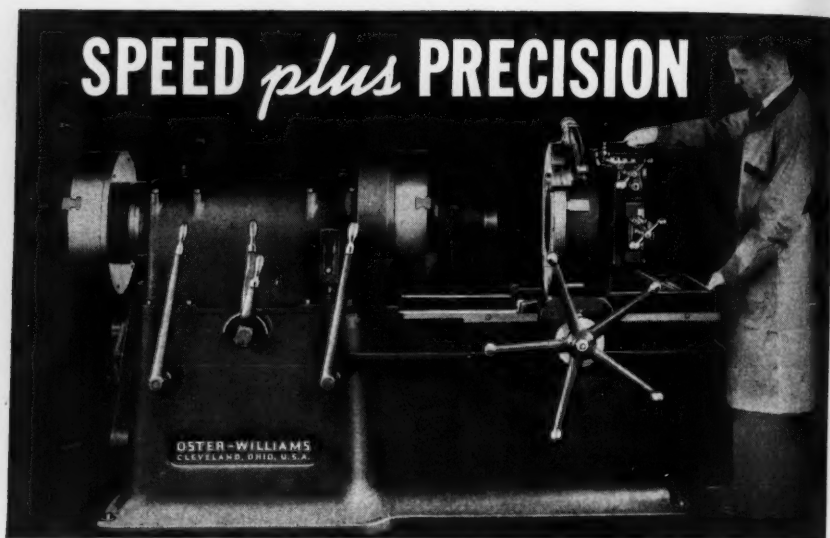
The R. K. LeBlond Machine Tool Co.
Cincinnati, Ohio. Dept.
Here's my quarter . . . send the book.

Name _____
Address (or Co.) _____ State _____
City _____



*What makes
Main Street?*

LeBlond - Cincinnati, Ohio, U.S.A.



Where time means money and precision-production is essential, the **OSTER Rapiduction Pipe-Threading Machine** is the right choice. Users say "No job can balk a Rapiduction." Send for completely illustrated descriptive folder. Write

THE OSTER MANUFACTURING COMPANY

Sales Office: 2061 East 61st Street, Cleveland, Ohio

Factories: Erie, Penna., and Cleveland, Ohio

New York City Showroom and Office, 292 Lafayette St.

Philadelphia Showroom and Office, 111 North 3rd St.



Threading Headquarters Since 1893

RAPIDUCTION

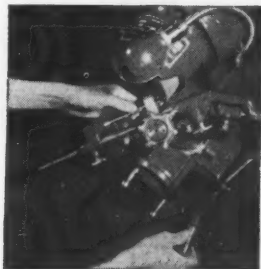
SPEED WITH PRECISION

in a Grinder for Small Drills

SELLERS Grinders—widely known for producing the famous Sellers Drill Point, recommended by leading drill manufacturers—are now offered for drills $\frac{1}{2}$ " and under. Same unique chuck and method of grinding. Same high production capacity. Many modern features. New streamlined compactness. And at a price within reach of every shop. Ask for Bulletin S-11.

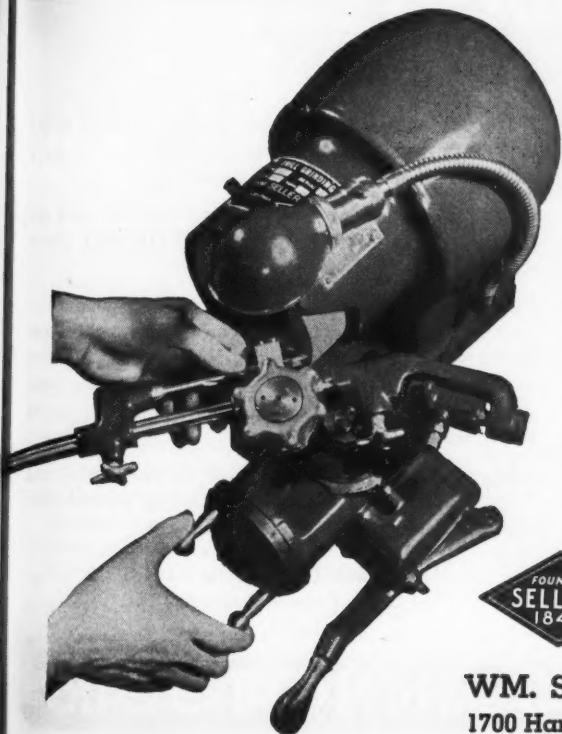


1 Insert the drill and a quarter-turn of the hand chucks it securely.



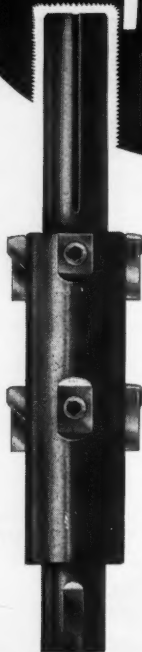
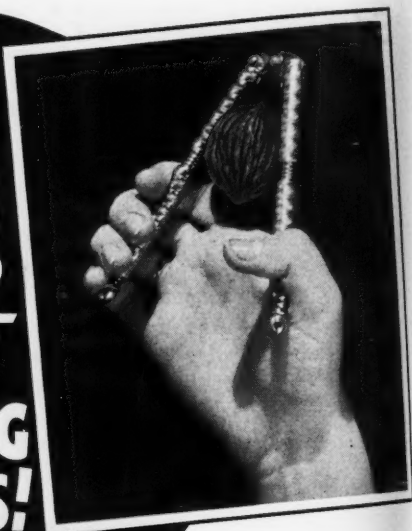
2 Move to grinding position.

3 Grind the scientifically correct point. No special skill required.



WM. SELLERS & CO., Inc.
1700 Hamilton Street - Philadelphia

If
**YOU HAVE A
 BORING JOB
 THAT'S A HARD
 NUT TO CRACK—**
try
**DAVIS BORING
 TOOLS!**



Have you an **UNUSUAL** Boring Job in your shop? One that's decidedly "different" or difficult — or that's costing you too much by present methods?

If so, we sincerely urge you to investigate at once the full possibilities of **SPECIALLY-DESIGNED** Davis Boring Tools.

In hundreds of shops — under all sorts of conditions — Davis Boring Tools have invariably brought about faster production, better work, lower costs. Some of our specially-designed, single-purpose tools have saved as high as 75% in boring time, besides producing better work!

Send us prints of your work, and let our Engineering Dept. make *you* a specific, money-saving recommendation. No obligation. Write us today!

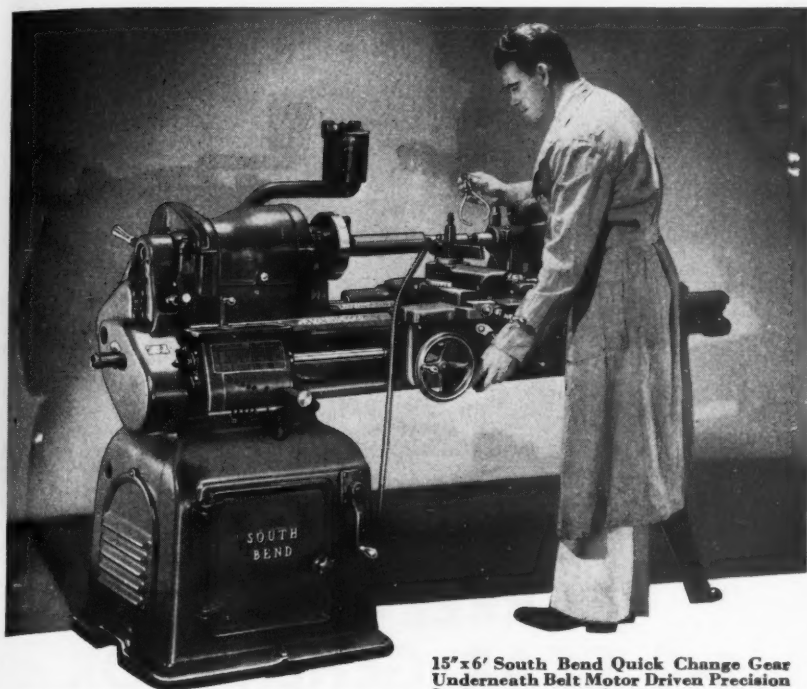
DAVIS BORING TOOL DIVISION
LARKIN PACKER COMPANY, INC.
ST. LOUIS, U. S. A.

DAVIS BORING TOOLS

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15"x6' South Bend Quick Change Gear Underneath Belt Motor Driven Precision Lathe on a manufacturing operation.

POWER and rigidity in production, accuracy and precision in tool and gauge work, and versatility in many different operations are characteristics required of the new 15-inch South Bend Series "T" lathe in hundreds of manufacturing plants, tool rooms, and machine shops. The fine workmanship, design, and new features of this lathe, combined with its smooth, quiet operation, assure quick and accurate handling of machining operations to the most exacting specifications.

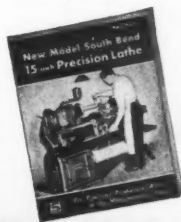
SOUTH BEND LATHE WORKS

370 E. Madison St.

South Bend, Ind., U.S.A.

68 Sizes and Types of Lathes for every purpose.

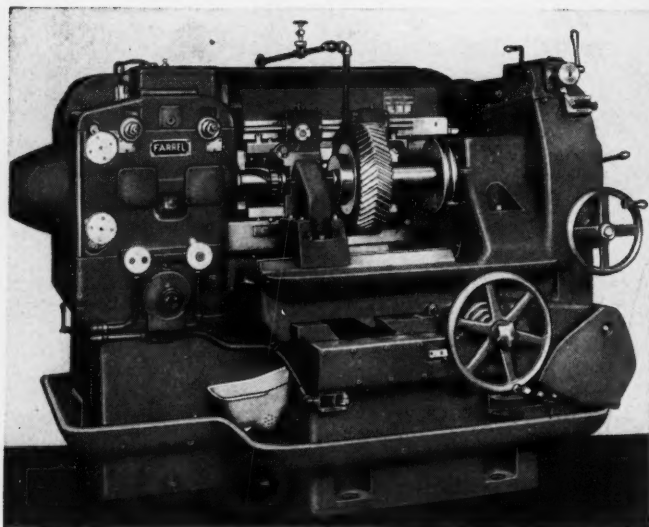
9" lathe prices start at \$287
11" lathe prices start at \$371
13" lathe prices start at \$448
15" lathe prices start at \$544
16" lathe prices start at \$642



Write **FOR BULLETIN**

Bulletin No. 15-C illustrates, describes and prices the different models of the 15-inch lathe. Copy sent free, upon request.

SOUTH BEND *Precision* **LATHES**



FARREL-SYKES 2-C GEAR GENERATOR

The
UNIVERSAL
AUTOMATIC
GEAR MACHINE
for

high
PRECISION
high
PRODUCTION

•
suitable for
LINE PRODUCTION
GENERAL JOBBING
and
TOOL ROOM WORK

The new Farrel-Sykes 2-C Gear Generator has been designed and developed to provide the utmost precision with high speed operation in the generation of gears of all types which operate on parallel axes and a variety of toothed forms and special contours.

Its in-built precision results in quiet operation, long life and low upkeep, and in the production of precision gears which operate more smoothly and quietly, and with greater efficiency and durability. Automatic features make the 2-C machine extremely easy to operate and contribute to the high output which places it in the first rank as a profit-making tool wherever used.

Capacity: 0 to 25" diameter; 24 D. P. to 3 D. P. helical and 2½ D. P. straight teeth; 0 to 8" face.

Complete information and specifications on request.



FARREL-BIRMINGHAM COMPANY, Inc.
381 VULCAN STREET - - - - - BUFFALO, N. Y.

The Gear with a Backbone

**MONA
MAKES**

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THE MONA
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MONAR

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• Pitts
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• Inc
3115

MONARCH'S TAPER ATTACHMENT MAKES "TAPER TURNING HISTORY"

The impetus that this exclusive Monarch feature has given to the development of turning practice is evident in outstanding advantages like these:

1. Accurate smooth tapers are turned or bored under all conditions;
2. Far heavier cuts may be taken than are possible with the conventional taper gibbed friction type of taper attachment;
3. Far steeper tapers can be turned or bored than with other taper attachments, up to 90° included angle;
4. Can be furnished to turn tapers at one setting the full length capacity between centers of the lathe;
5. Can be furnished with contour turning or boring attachment.

Length Turning Capacity Now Multiplied

Every Monarch Anti-Friction Bearing Taper Attachment, when equipped with the taper attachment Variator, will turn any taper within its capacity for the full length between centers of the lathe... and at one setting of the taper attachment:

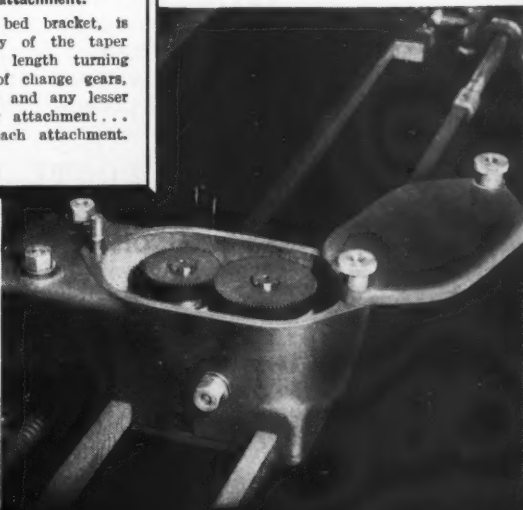
Only one set of pick-off gears, for the geared bed bracket, is required to increase the length turning capacity of the taper attachment (at one setting) to the maximum length turning capacity of the lathe. Equipped with this set of change gears, it is possible to turn any lesser length of taper and any lesser degree of taper, setting the swivel of the taper attachment... according to a simple formula furnished with each attachment.

Modernize with Monarch!

THE MONARCH MACHINE TOOL CO.,
Sidney, Ohio, U. S. A.

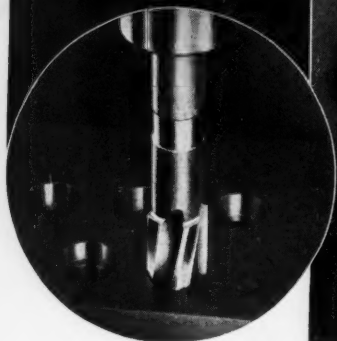
MONARCH LATHES
COVER THE TURNING FIELD

- Newark Sales Office: 1060 Broad Street.
- Chicago Sales Office: 622 West Washington Boulevard.
- Pittsburgh Sales Office: 604 Chamber of Commerce Building.
- Indianapolis Sales Office: 3115 North Meridian Street.



STURDY SENSITIVE DRILLS

for
TOUGH
DRILLING
JOBS



WHEN toolroom or production lines need a husky drill for counterboring or countersinking work, the No. 2 Footburt Sipp with back gear unit will fill the bill. Slow speed of 185 R.P.M. and high speed of 2300 R.P.M. provide a range for a wide variety of jobs.

Write for Latest Circulars

THE FOOTE-BURT COMPANY

CLEVELAND, OHIO

Detroit Office: 4-151 General Motors Building

FOOTBURT SIPP SENSITIVE DRILLS

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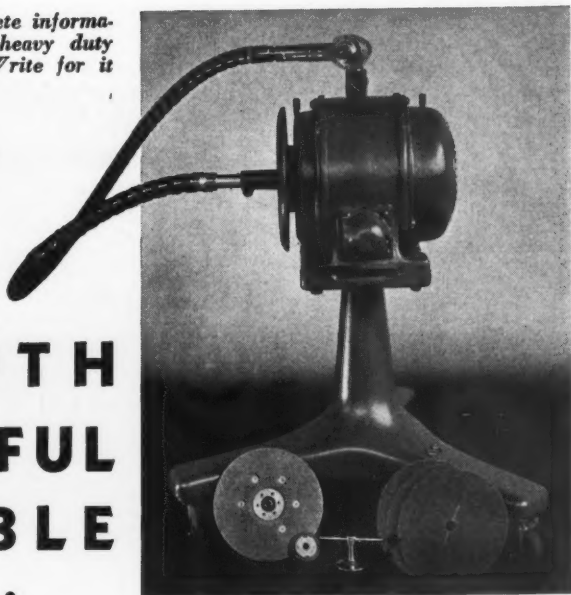
P
DIVISI
BEMEN

Let us send you complete information on this Kellerflex heavy duty flexible shaft machine. Write for it today.



**S M O O T H
P O W E R F U L
F L E X I B L E**

. . .



THE KELLERFLEX DL-6 Heavy Duty Machine

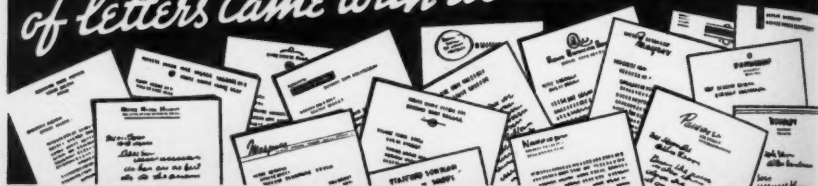
Equipped with a 2 H.P. heavy duty ball bearing motor, 3450 R.P.M. at 60 cycles, totally enclosed, air-cooled, and provided with a special deflector casting. The motor bracket is ball bearing mounted, and swivels 360° horizontally in an oil reservoir on a heavy cast iron tripod pedestal. For sanding the standard cable is 9/16"x6½' heavy duty, and wound for strength, light weight and flexibility. This cable runs in a heavy duty, non-shrinking rubber fabric sheath designed

to resist oil, heat and abrasive. It is made with an inner spring steel liner strengthened by wire mesh. The complete sheath is reinforced at both ends by heavy flat coil supporting springs. As shown the machine is equipped with a right angle attachment.

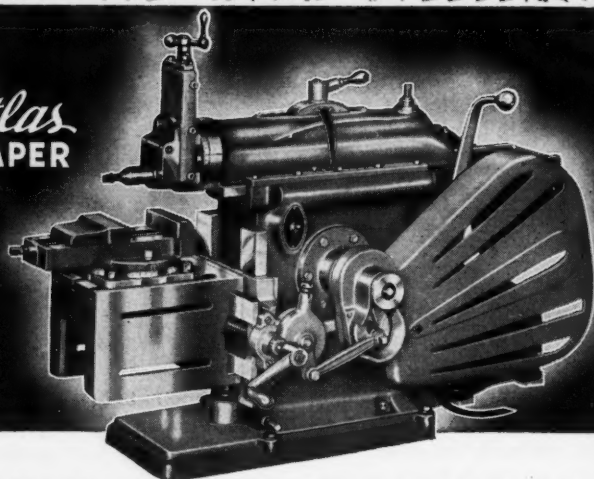
If your finishing work includes heavy grinding, sanding and polishing on large pieces, write for complete information on this machine. It will prove an economical investment.

P R A T T & W H I T N E Y
DIVISION NILES-
BEMENT-POND-CO. **Hartford, Conn.**

*Almost an Avalanche
of letters came with its announcement!*



THE
Atlas
SHAPER



No one thing this company has ever developed has received such a tremendous ovation as this new precision 7" Bench Shaper. Letters asking for more information read like a roster of American big business.

All the features of larger machines are embodied in this new Atlas—precision, power, rugged strength, and more versatility—at a price

that sets a new standard of value in metal shapers. The drive is standard bull type powered by V-belts from motor to spindle. There are four speeds between 45 and 200 strokes a minute, five surface feeds in either direction.

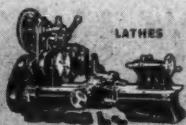
We want every executive concerned with problems of tool room and shop to know about this new Shaper. If you haven't written yet, do it now.



ATLAS PRESS CO.

1146 N. Pitcher St.
Kalamazoo, Michigan

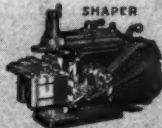
ATLAS
PRESSES



LATHES



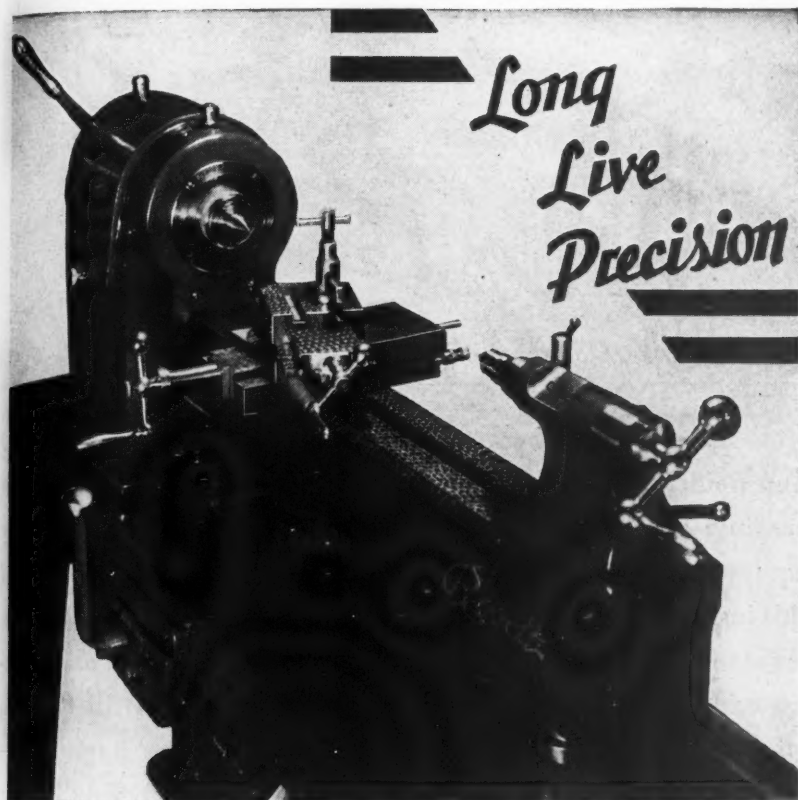
DRILL PRESSES



SHAPER



DRILL GRINDING
ATTACHMENT



*Long
Live
Precision*

T O GIVE PRECISION

Timken zero precision mirror finish roller bearings
—dynamic balance of every rotating part—
accurate gauging and inspection

T O KEEP PRECISION

Maximum slide areas—sturdy construction—
three point bed mounting—perfection in ma-
terial and workmanship

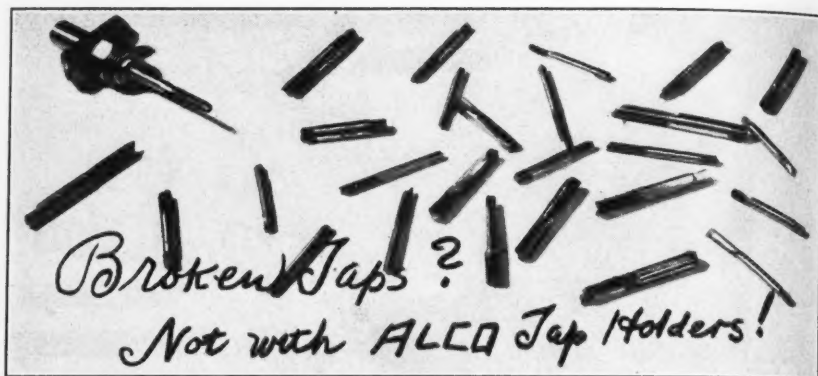
RIVETT

LATHE & GRINDER INC.

BRIGHTON, BOSTON, MASS.

PIONEERS IN BENCH

LATHE DEVELOPMENT



Most taps are broken because of lack of concentricity. Since ALCO Tap holders are so adjustable — and easily adjustable — that absolute concentricity is assured, you can *insure* your taps by equipping your screw machines with ALCO Tap Holders. And this insurance is at a low rate, for the cost of the ALCO Tap Holders is soon amortized by your savings in tap expense . . . *and bushing expense*, for these tap holders, like the ALCO Drill Chucks, eliminate the necessity for bushings. But just as important—possibly even more so—is the fact that the ALCO Tap Holder will produce more accurate threads. Just these features alone are sufficient to justify your placing your order immediately for a sufficient number of ALCO Tap Holders to modernize your screw machines. There are other important exclusive features, so, if you want to keep pace with modern production practices—and we are sure you do—write today for full particulars. The Alco Tool Company, Bridgeport, Conn., U. S. A.

ALCO TOOLS

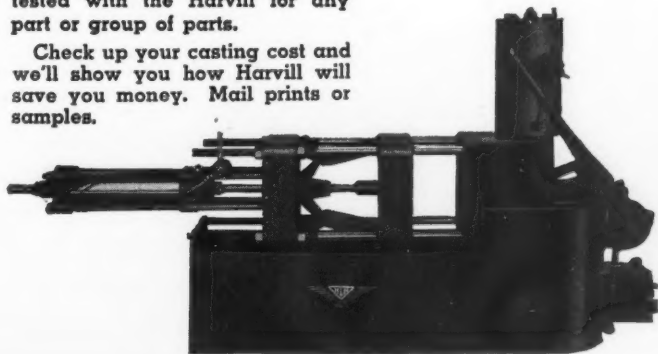
EFFICIENT

MAKE YOUR OWN DIE CASTINGS WITH A SMALL INVESTMENT THAT YIELDS BIG PROFITS AND SAVINGS

This revolutionary machine eliminates "farming out" castings, split profits and uncertain production. Now you can cast your own products; make the profit yourself and have your castings when you want them. The Harvill costs only about one-half as much as other pressure die-casting machines of equal capacity, offers maximum production at minimum maintenance cost — can be operated by unskilled labor.

Dies can be furnished and tested with the Harvill for any part or group of parts.

Check up your casting cost and we'll show you how Harvill will save you money. Mail prints or samples.



HARVILL
HIGH-PRESSURE
DIE CASTING
MACHINES

H. L. HARVILL, INC.

2344 East 38th Street, Los Angeles, Calif.

Please send me your High-Pressure Die Casting Machine Catalog.

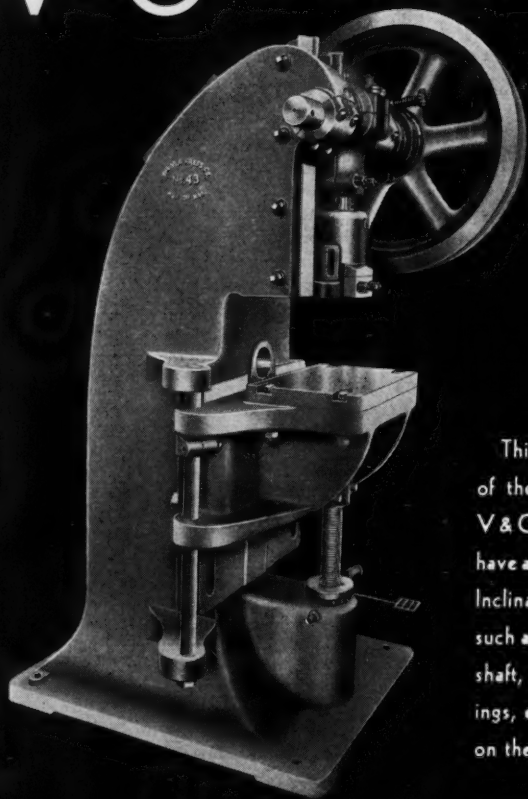
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Firm

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City State

V&O HORNING PRESS



This photograph shows one of the many horning presses V&O makes. These machines have all of the outstanding V&O Inclinable press characteristics, such as the long slide, eccentric shaft, and over-hanging bearings, etc. Write for a bulletin on these machines.

THE V&O PRESS COMPANY HUDSON, N.Y.

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MEYER MACHINERY CO., LOS ANGELES,
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USE BARBER-COLMAN GROUND HOBS

Enlarged Fifty Times Size Tooth Form Splits The Line

Design right, material right, machining right, heat treatment right, finishing by Barber-Colman grinding right — Barber-Colman Ground Hobs must be right. When enlarged 50 times, the projected tooth-form splits the line on an accurate layout. In service, Barber-Colman Ground Hobs provide the ultimate in accuracy, fine finish, high production, and durability. Use Barber-Colman Ground Hobs for accuracy, service, value.

for Accuracy



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CHINES, REAMERS,
REAMER SHARP-
ENING MACHINES,
SPECIAL TOOLS

BARBER-COLMAN COMPANY

General Offices and Plant ROCKFORD, ILLINOIS, U. S. A.



Pacemakers in the measuring instrument field

In accuracy as well as durability, Lufkin Tapes, Rules and Precision Tools actually set the pace. They are precision made, you can depend on them to give correct measurements. They are sturdy, they stand up on the job. It's no wonder Lufkin

measuring instruments are the choice of good workmen. It's no wonder so many men insist the name "Lufkin" appear on every tape, rule or precision tool they buy. You'll find a description of every Lufkin product in Catalog No. 12. Write for free copy.

NEW YORK

100-110 Lafayette St.

THE LUFKIN RULE CO.

SAGINAW, MICHIGAN, U.S.A.

Canadian Factory

WINDSOR, ONT.

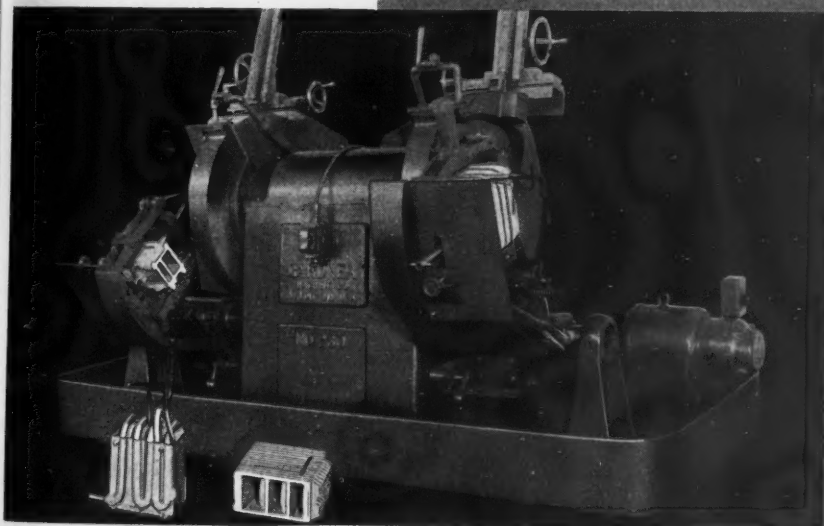
Evaporator coil assemblies —

a tough job "licked" by
GARDNER-GRINDING!

The bottom surface of these cast aluminum evaporator coil assemblies is ground flat within $\frac{1}{32}$ " at an average rate of 60 per hr., per operator, on this No. 230-30" Gardner Grinder. Stock removal runs from $\frac{1}{16}$ " to $\frac{1}{8}$ ". The two mechanically oscillated work tables reduce manual effort to a minimum. The job is ground wet.

THESE refrigerator evaporator coil assemblies represent a tough grinding job because of their size, and because they are aluminum castings with a fairly thin wall section. The largest measures $12\frac{1}{2}$ " wide x $10\frac{3}{8}$ " high x $11\frac{1}{2}$ " long, and the bottom surface is ground flat within $\frac{1}{32}$ ".

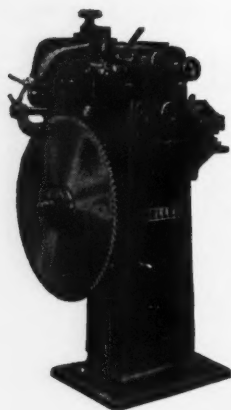
The machine that "licked" this job is a Gardner No. 230-30" Grinder carrying two power-operated work tables, and our standard wet grinding system. A special hand-clamping fixture is mounted on each table, and two operators are used. Brief production data is printed above the illustration.



Let GARDNER figure on Your tough jobs — Ask for Bulletin 200B!

GARDNER MACHINE COMPANY

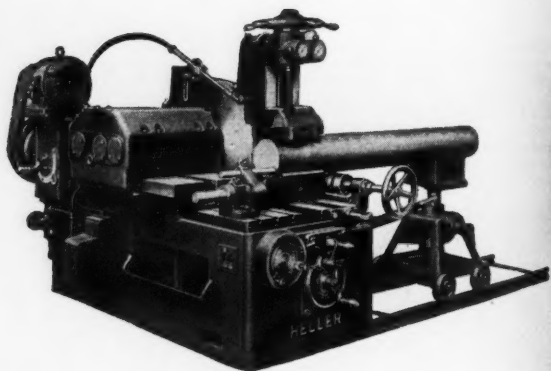
428 East Gardner Street • • • • • Beloit, Wisconsin, U. S. A.



"Triple Economy"

pays

Big Dividends



• Every phase of cold sawing is covered by Heller.

"Triple Economy" invariably results when Heller furnishes Blades, Cold Metal Sawing Machines and Blade Sharpening Machines, and coordinates the application of three essential pieces of equipment to the job at hand.

We would like an opportunity to prove that the "Triple Economy", realized through Heller complete service, means savings that quickly repay first cost and insure continuous returns on the investment.



HELLER MACHINE COMPANY

114 LIBERTY STREET • NEW YORK, N. Y.

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TUF-FLEX

This new hack saw blade has already proved a sensation. It's an entirely new type—super-tough, super-flexible, extra hard—a general purpose blade that stands a remarkable amount of abuse without stripping on thinnest sheet or tubing. Its performance on large sections, drill rod, tool steels, etc., is amazing. TUF-FLEX cuts smoothly, efficiently, is practically unbreakable.

We challenge you to try TUF-FLEX blades on any jobs where ordinary tungsten blades are now used. We promise unusual performance and the lowest blade cost you've ever experienced on general purpose work. Write for further particulars and name of nearest TUF-FLEX distributor.

MILLERS FALLS COMPANY

Greenfield, Mass.

Here's News.. Improved Wrenches!

WILLIAMS
SUPERIOR DROP-FORGED TOOLS
"SUPERIOR"
(CARBON STEEL)
WRENCHES

AVERAGE 93% as strong
as corresponding ALLOY
STEEL WRENCHES
... COST MUCH LESS

No longer need you pay a high premium for the added strength once available only in Alloy Wrenches. It took Williams with their more than fifty years of wrench-making experience to bring industry this sensational wrench. Exhaustive tests demonstrate that all patterns and sizes of Williams' "Superior" Wrenches average 93% as strong as corresponding Alloy Wrenches.

Drop-forged from a selected quality carbon steel, specially processed, Williams' "Superior" Wrenches are so designed that they provide a better hand grip than the usual thin Alloy Wrench as well as increased bearing on the nut. Available in 50 patterns—more than 1,000 sizes. Demand Williams' "Superior" Wrenches from your distributor.

J. H. WILLIAMS & CO.
75 SPRING STREET, NEW YORK

Get this FREE BOOKLET

Every mechanic and tool buyer needs this helpful, informative booklet. Complete tables give correct wrench opening for U. S., S. A. E., American Standard Nut and Cap Screw sizes. Data on wrench types and applications, how to select the proper wrench for your needs.

Write your name and address in margin below, tear off on dotted line and mail.



11 MMS

Consider

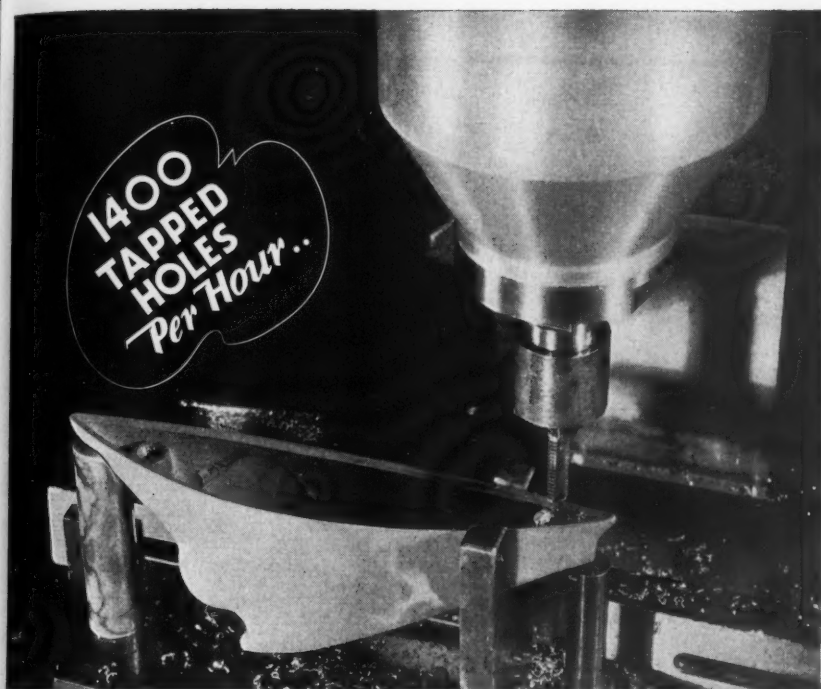
these Facts when

Selecting **YOUR Wrenches**

1. All patterns and sizes of Williams' "Superior" (carbon steel) Wrenches average 93% as strong as Williams' Alloy "Superrenches" of corresponding dimensions!
2. Williams' Alloy "Superrenches" are as strong as ANY alloy wrenches made commercially!
3. BUT . . . "Superior" (carbon steel) Wrenches are actually **STRONGER** than Alloy "Superrenches" in the double end Engineers' Pattern, which is of popular thinner design. Also they provide increased bearing on the nut and better hand grip than the usual thin Alloy Wrench. Since Williams' "Superior" Wrenches also cost much less:

WE DEFINITELY RECOMMEND

. . . "Superior" Wrenches (Improved Carbon Steel) for most industrial uses. "Superrenches" (Alloy Steel) of the thin type for automotive and other close-quarter work, or where the user is willing to pay more than 50% extra for higher tensile and chrome-plating.



Trouble-makers, these odd-shaped die castings. With other types of equipment the handling time for this job was much greater than the tapping time, resulting in low production, unnecessary operator fatigue.

But the Haskins Method makes another tough job easy. A simple sliding fixture — no clamps — operator fatigue reduced to a minimum — production increased to 700 pieces per hour!

Have **high-speed, precision** tapping in your plant. Have longer tap life — lower tapping costs — at no extra cost over your present method. Investigate the **Haskins Method**.

PRODUCTION LINE PROOF — illustrated above is No. 84 of a series of case histories showing tough jobs made easy — done better and faster — by the Haskins Method.

Material, Zinc base die casting.
Net Production, 700 pcs. per hr.
Size of Tap.....5/16"-18
Depth of Tapped Hole..... 1/2"
RPM of Tap "in".....1750
RPM of Tap "out".....3500

Write for a complete, illustrated booklet describing the Haskins Tapper in detail.
R. G. Haskins Company,
4867 W. Fulton Street,
Chicago.



European Representative — G. E. Maibach, Ltd.,
Humphreys House, London, S. W. 1.

Haskins
Hi-Speed TAPPING EQUIPMENT
with Greater Adaptability



SINE ANGLE PLATE

For measuring angles in any part of the quadrant within one minute or less—only a two inch micrometer is necessary.

**EXTREME ACCURACY
NO CUMBERSOME
SET-UPS**

Bulletin available on
KARNETICS

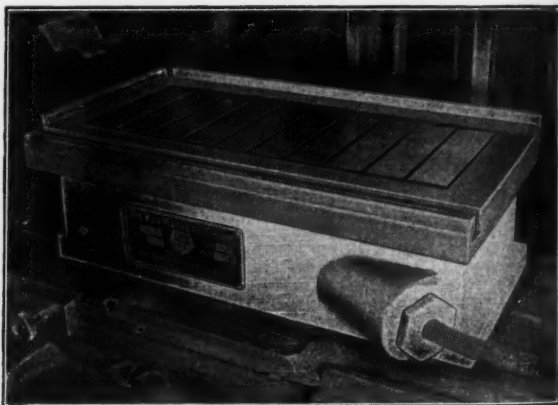
time saving accessories for
use on any magnetic chuck.

A MAGNETIC CHUCK THAT'S DIFFERENT

THE KAR DUO MAGNETIC holds work during a machine operation and this same chuck **DEMAGNETIZES** the work it has held.

The all aluminum body of lesser weight reduces wear and tear of grinding machine.

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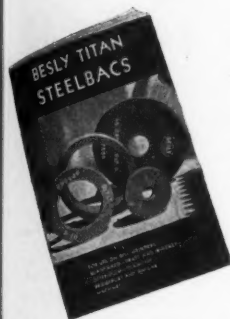
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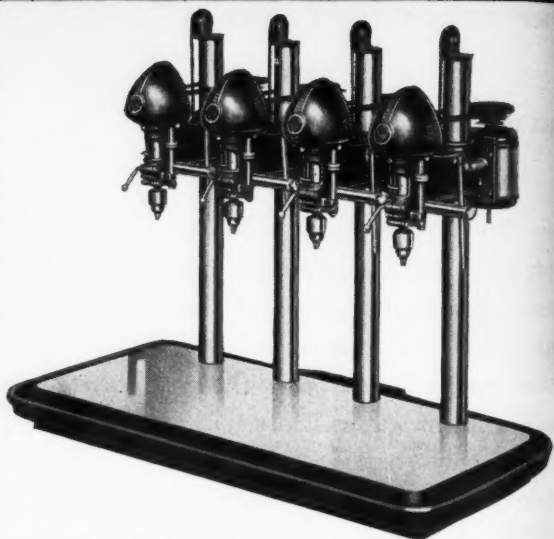


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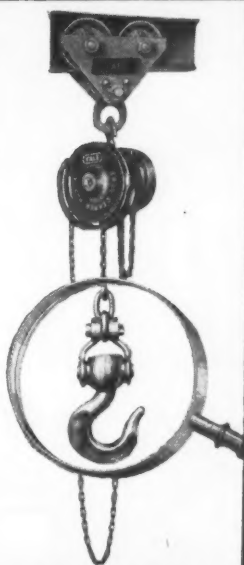
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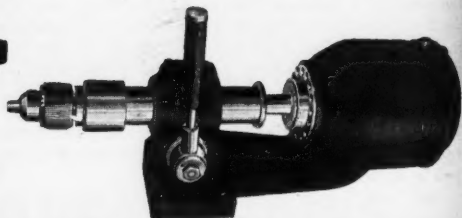
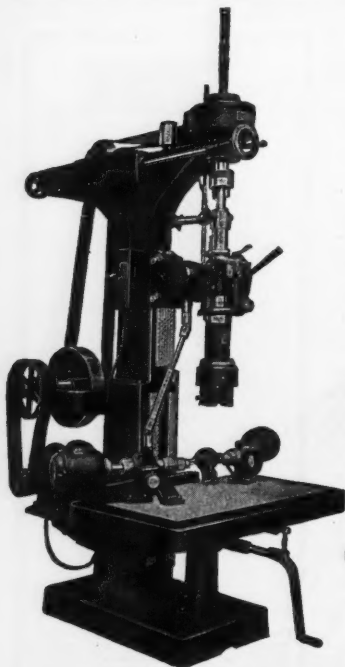
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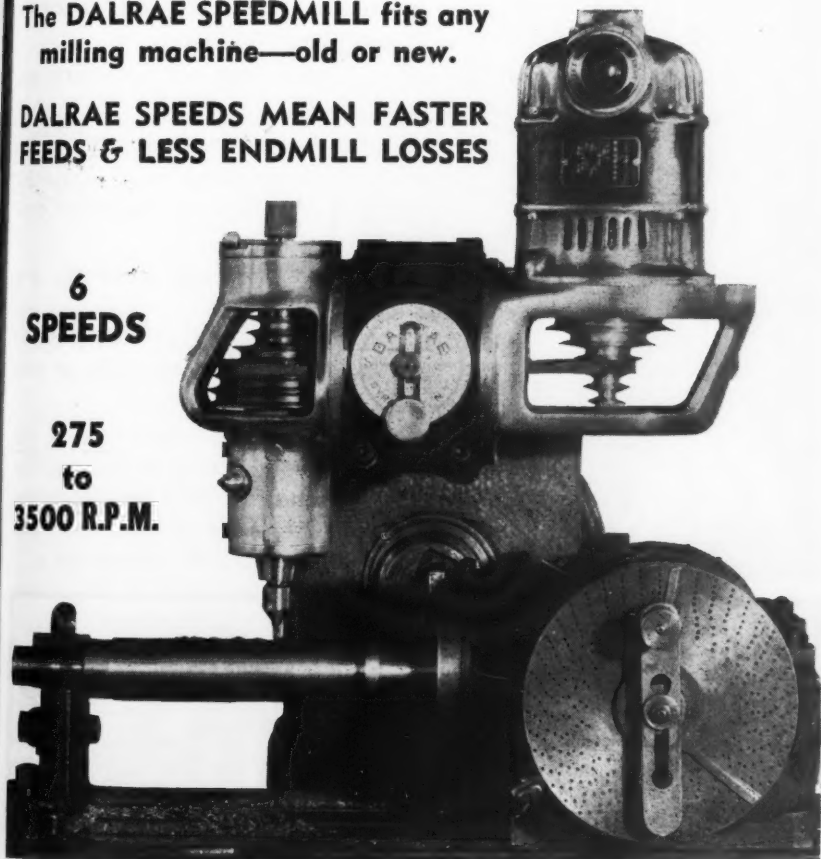
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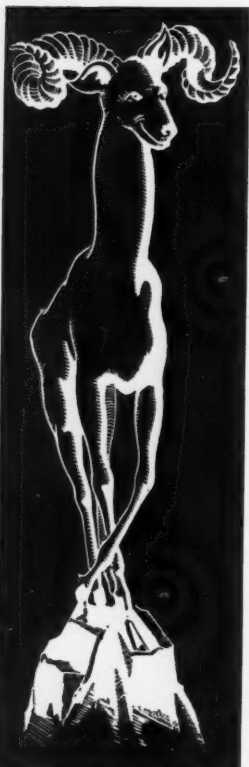
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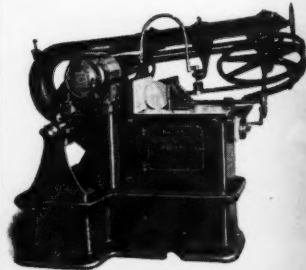
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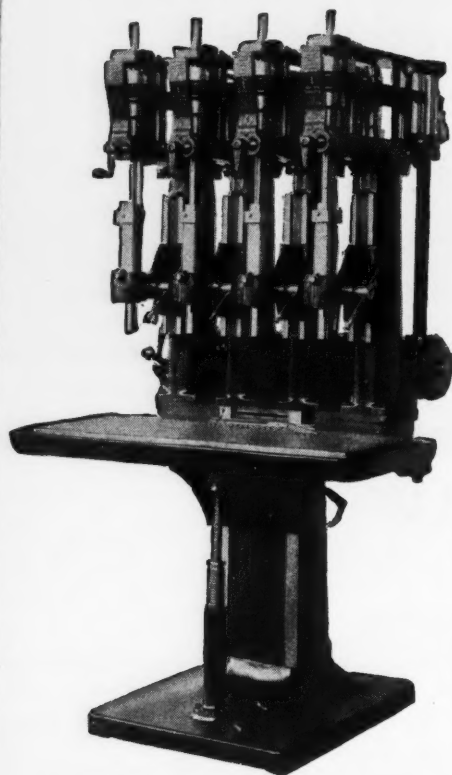


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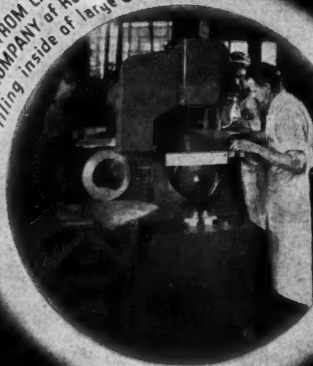
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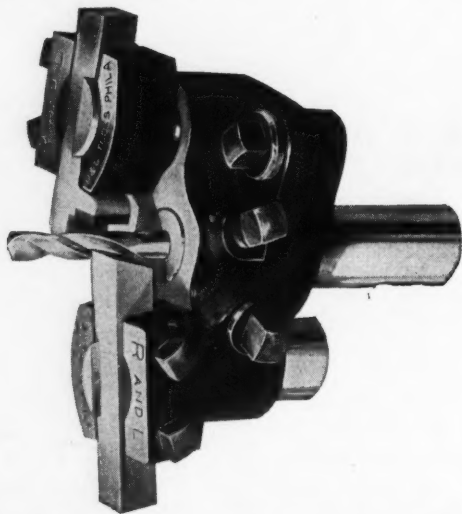
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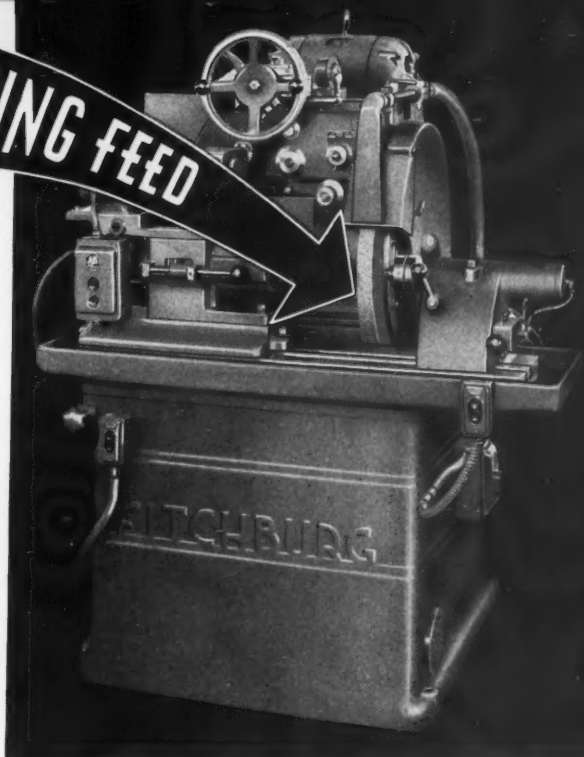
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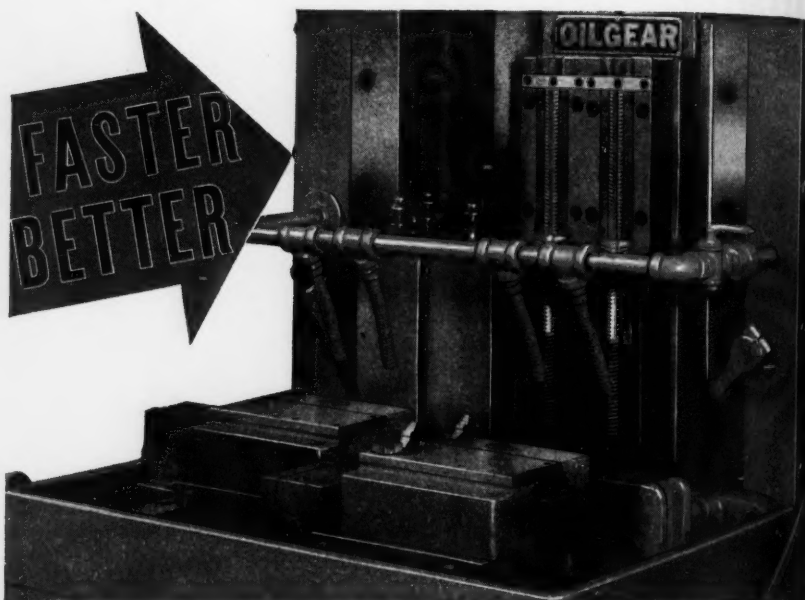
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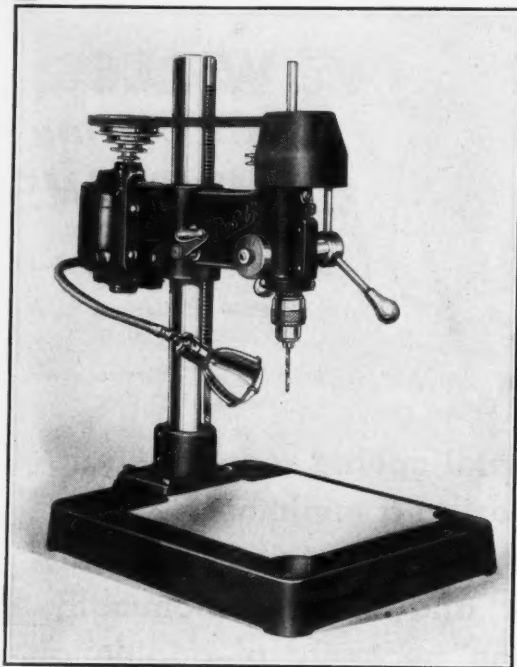
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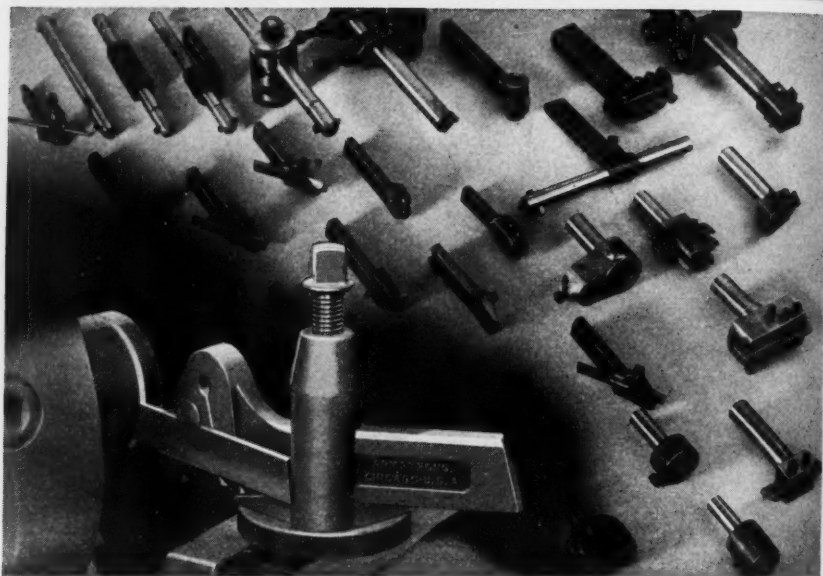
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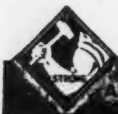
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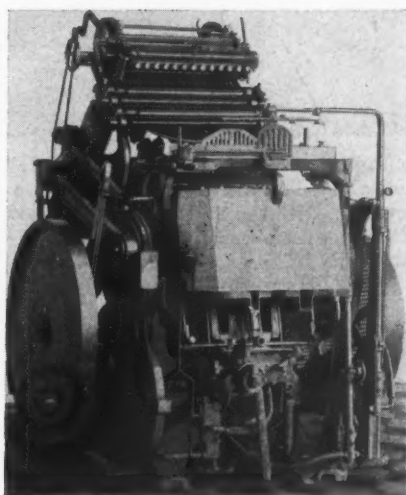
NOVEMBER, 1937

VOL. 10, No. 6

Interesting Operations in the Building of Chandler & Price Printing Presses

BY HOWARD CAMPBELL

THE smoothness with which a modern printing press operates gives no hint to the casual onlooker as to the engineering skill and fine workmanship which has made such smooth operation possible. In such a machine, however, delicacy of design is combined with sturdy construction to produce a machine that will be capable of adjustments within a ten-thousandth of an inch, yet also capable of continuous operation for an indefinite period. Such a machine is the "Craftsman" Press now being built by The Chandler & Price Company, Cleveland, Ohio. A few of the interesting operations involved in the pro-



duction of the machine are described herewith.

The Chandler & Price "Craftsman" Press, which is of the Gordon type, is constructed upon a frame consisting of a one-piece solid casting with heavy reinforcing ribs which provide a solid foundation and maintain perfect alignment of the shafts and bearings. The main shaft holes must be machined very accurately and, accordingly, this operation is performed in a Giddings & Lewis horizontal boring mill, shown in Fig. 1. Davis boring heads are used, which are capable of the finest adjustments. The rough boring operation removes the scale and approxi-

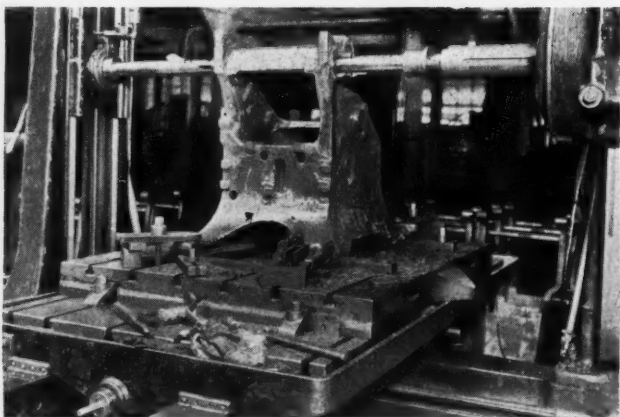


Fig. 1—Boring machine for boring shaft holes in the Chandler & Price "Craftsman" Automatic Feeding Press.

mately $3/16$ in. of stock, leaving $1/32$ in. of stock for the finish boring operation. In the finish boring operation, the holes are finished to within 0.003 in. of the specified size.

The illustration Fig. 2 shows the boring and facing operations on two sets of shaft holes in a 12×18 -in. bed for a Gordon press. In the immediate foreground can be seen two drills which enter the bearings from the outside. Supplying power to these drill spindles is a very simple matter; supplying power to the cutter heads in the center of the illustration, which face the inside faces of the bearing

which, in turn, is powered by the universal shaft which extends to the left of the picture. The shaft has an extension joint so that it functions properly with the cutter head located anywhere within the range of the two bearings. The head containing the spindle carrying the two cutters is moved first to one side and then to the other in order to mill the faces of both bearings. In this operation the bearing holes are drilled to $1-15/32$ in. to be later reamed to $1\frac{1}{2}$ in., the bearing faces are milled, and the main shaft holes are bored to $3\frac{1}{2}$ in. diameter.

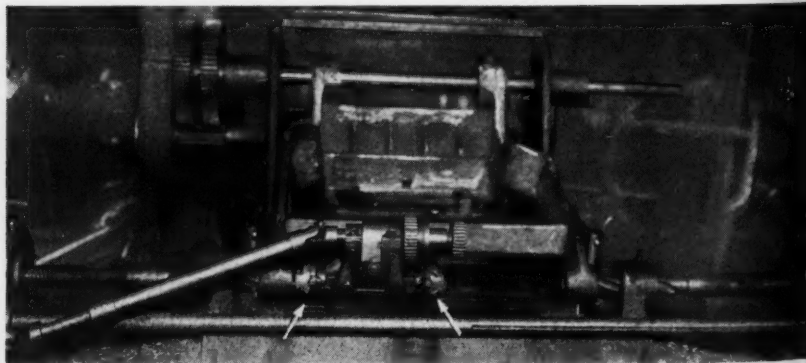


Fig. 2—Boring the shaft holes in the bed for a 12×18 -in. Gordon press.

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Fig. 3—

The boring of the main shaft holes is accomplished by means of an ingenious mechanism. The boring bar, which can be seen in the rear in the photograph, is a 1½-in. shaft, the end of which is threaded with three square threads per inch. This end of the shaft also contains a longitudinal keyway to which a 75-tooth gear is keyed, the key being a sliding fit in the shaft. Also upon this end of the shaft is located a 72-tooth gear threaded in the hub with three square threads to the inch to fit the thread on the shaft. These two gears are close together and both mesh with a pinion carrying a pulley to which power is transmitted by a belt.

When power is applied, the 75-tooth gear revolves the shaft and as the 72-tooth gear must also revolve 75 teeth with each complete revolution of the 75-tooth gear, the 72-tooth gear revolves three extra teeth for each revolution of the 75-tooth gear. This

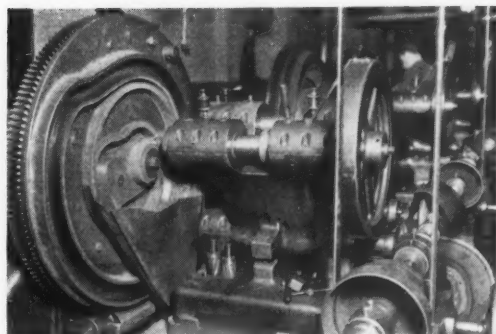


Fig. 4—Milling a cam raceway in a cam.

extra movement of the 72-tooth gear feeds the shaft longitudinally through the hubs of both gears and through the bearings in which it is located, thus providing the necessary feed to bore the bearing holes in the work-piece.

After the frame for the "Craftsman" Press has been completely machined, the bushings are pressed into the main bearing holes. These holes are then reamed with a line reamer, removing some 0.0025 in. of stock and leaving from 0.005 to 0.006 in. of stock to be removed in the final operation.

The final operation on these bearings is that of honing, which is done with a Hutto hone as shown in Fig. 3. To obtain perfect alignment for the honing operation, the hone is made with a pilot which is a slip fit in a pilot bushing which is slipped into place in one of the bearing holes while the other bearing hole is being honed to size. The end of the pilot can be seen projecting from the right side of the casting in the illustration. Power is applied by means of a Black

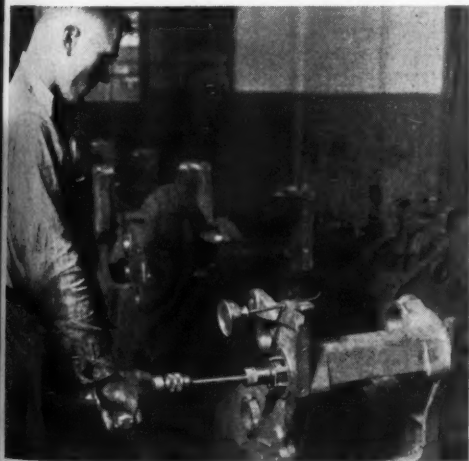


Fig. 3—The main bearing holes are finished to size by honing with this Hutto hone.

& Decker electric drill and the 0.005 in. of stock is removed in from 10 to 15 minutes, leaving a mirror-like surface in the bearing.

Figure 4 shows the operation of milling a cam raceway in a large cam wheel which will determine the opening and closing of the press platen.

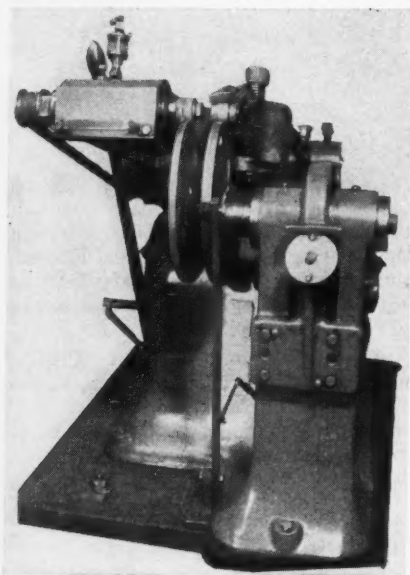


Fig. 5—Cams are finished to size by grinding in this special cam grinding machine.

The operation is being performed in a special cam machine and the finished raceway is accurate within 0.002 in. The stock is being removed with a 1-15/16-in. spiral cutter.

Figure 5 shows the grinding of a chilled cast iron cam, for which operation a special machine is used. The work-piece is bolted to a spindle which also carries a master cam, shown at the right in the illustration. The grinding wheel spindle is carried in a bearing which forms part of a hinged mechanism which also carries a cam roller. When ready to grind the cam,

the cam roller is rested upon the master cam and, as the spindle carrying both the master cam and the work-piece revolves, the cam roller naturally follows the contour of the master cam, forcing the grinding wheel to do likewise. Thus the work-piece is ground to the exact contour of the master cam. The spindle carrying the master cam and the work-piece travels at a speed of 1 r.p.m. and the wheel speed is 13,000 r.p.m. The finished cam must be within 0.015 in. of the size of the master cam and must have a glass-like finish.

The operation shown in Fig. 6 is that of milling the ratchet on the ink-ing disk for a 14½x22½ new series Gordon press. As can be seen, a vertical milling attachment is used carrying a 45-deg. cutter, and the disk is clamped to a circular table which forms part of an attachment that is anchored to the milling machine table. The ratchets must all be cut at the same angle and must be of the same length. Longitudinal table feed is used, the feed being disconnected automatically at the proper place in the cut by the device shown in Fig. 7.

With the feed engaged and the table moving toward the right in the illustration, the finger A pushes the dog B with it and incidentally the shaft carrying the dogs C and D. The dog C pushes the lever E until it reaches the point at which it reverses the table feeding mechanism in the usual manner, causing the table to reverse its direction and feed back toward the left by rapid traverse. As this takes place, the ratchet F, which has caught on the latch G, is held and is thus forced to rotate on the bolt by which it is pinned to the machine, throwing the pawl H into engagement with one of the ratchet teeth on the underside of the circular table. As the machine table travels to the left, the pawl H is also forced to swing to the left, forcing the circular table to

rotate until the movement of the machine table is reversed again. This is always, of course, a definite amount. When the machine table has reversed far enough, the lever E is automatically thrown again, reversing the table feed and starting the cut in the new metal which has been presented to the cutter. This device not only saves the operator's time, being completely automatic, but it also insures the accurate machining of the ratchet on the inking disk.

The operator shown in Fig. 8 is straightening crankshafts for Gordon or automatic presses. The machine is an old lathe equipped with a 18-in. diameter hydraulic cylinder supported by a frame work which rides on four wheels on the ways of the lathe. The four vertical corner shafts of the frame extend down be-

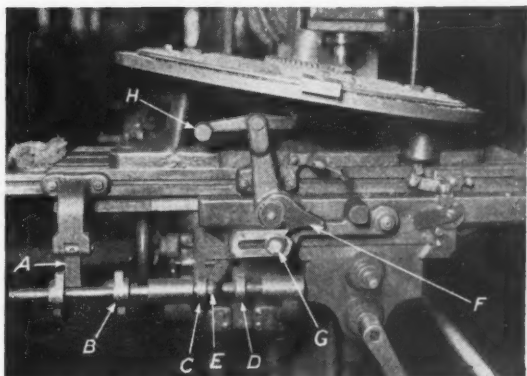


Fig. 7—Device for automatically revolving the work-piece between cuts.

low the lathe bed to receive cross braces under the bed which prevent the frame from lifting when the full power of the air is applied for straightening.

Both the head and tail centers of the lathe are equipped with sockets into which the ends of the rough shaft are placed. With the shaft thus in position, the operator rotates it by hand until he determines just where the straightening—if any—is needed. After thus locating the high point, supports, one of which is indicated at A, are screwed into position under the ends of the shaft to receive the downward thrust and the straightening proceeds.

Upon the lower end of the piston rod of the air cylinder is threaded a "nose" which can be screwed downward by hand until it rests upon the shaft. With the nose in contact with the shaft, the air valve is opened and pressure is applied to

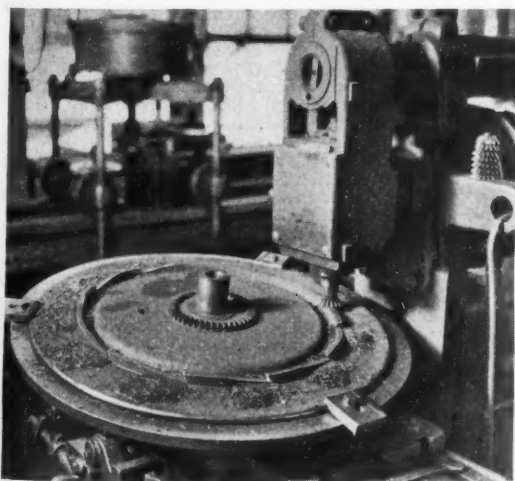


Fig. 6—Milling the ratchet on an inking disk for a Gordon press.

the piston. The 18-in. inside diameter of the cylinder with 80 lbs. pressure of air makes available a total pressure of 1900 lbs. The operator is shown in the act of opening the air valve, which he closes at just the right instant to obtain the desired pressure. Long experience on this job has made it possible for the operator to tell just ex-

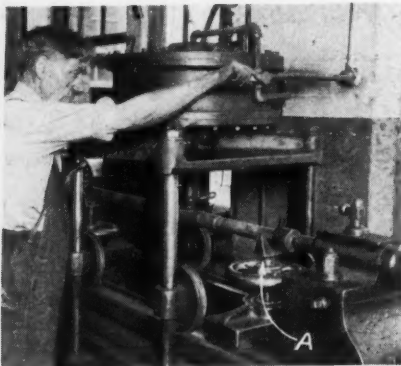


Fig. 8—Straightening rough crankshafts for Gordon printing presses.

actly how much pressure is needed to straighten out a kink in a shaft without bending it more than is necessary. After the air has been applied, the piston is raised by reversing the valve, the supports A are lowered by spinning the hand wheel, and the shaft is again tested for straightness.

The operations described above are a few of many interesting operations in the building of Chandler & Price presses.

Severance Tool Mfg. Co. Catalogue No. 11 and Booklet No. 11A. Two new pieces of literature have been issued by Severance Tool Mfg. Co., 1516 E. Genesee Ave., Saginaw, Michigan. Catalogue No. 11 lists 170 Standard Midget Milling Tools and Booklet No. 11A illustrates many special tools and uses. Copies may be obtained by signing your name on your company letterhead and mailing to the company.

Termed "a bookful of Lathe Low-downs" is the new Golden Anniversary catalog just published by The R. K. LeBlond Machine Tool Company, Cincinnati, Ohio, under the title "What Makes Main Street". The book was published to commemorate LeBlond's 50 years of service to industry, and is said to present an unusual treatment of the subject of lathes. While basically factual in its nature, it affords a new and original perspective of the Main Street of production where LeBlond Lathes have played a conspicuous part.

The forepart of "What Makes Main Street" is embellished with four color pastels by a noted artist, providing a lathe's eye view of the Main Street of today's production and civilization. The remainder of the book is given over to simplified and factual presentation of the complete LeBlond line, written in concise and understandable language in an endeavor to give a panoramic picture of LeBlond Lathes as the prime machine in industrial service. "What Makes Main Street" is featured in all current LeBlond advertising. Copy free to mechanical executives upon request.

Oilgear Bulletin 47000. The fluid power pumps and motors made by The Oilgear Company, 1323 W. Bruce St., Milwaukee, Wis., are described in the 56-page booklet just published by this company. Oilgear's comprehensive line of modern fluid power pumps and motors establish new standards of size, speed, performance and low cost, through an amazingly simplified mechanism. Standard variable and constant displacement units are available in conventional sizes having normal capacities from 2 to 150 h.p. and peak capacities up to 190 h.p. In addition, each size is available with one, two or three units having working pressure ratings of 1100, 1700 and 2500 lbs. per square inch and peak pressure ratings up to 3000 lbs. per square inch.

All variable stroke units are steplessly variable through standard devices, controllable either by hand, electric motor, hydraulic Servo-motor, pilot valve, load and fire mechanism, or pendulum and disc-type precision mechanisms, meeting all normal and many unusual and intricate linear or rotary transmission needs. They are now in use in many plants regarded as very progressive in the press, broaching, machine tool, steel, paper, printing, processing and rubber industries. The construction, principle of operation and application of Oilgear Fluid Power Pumps and motors are fully described in Bulletin 47000, copy of which will be sent on request.

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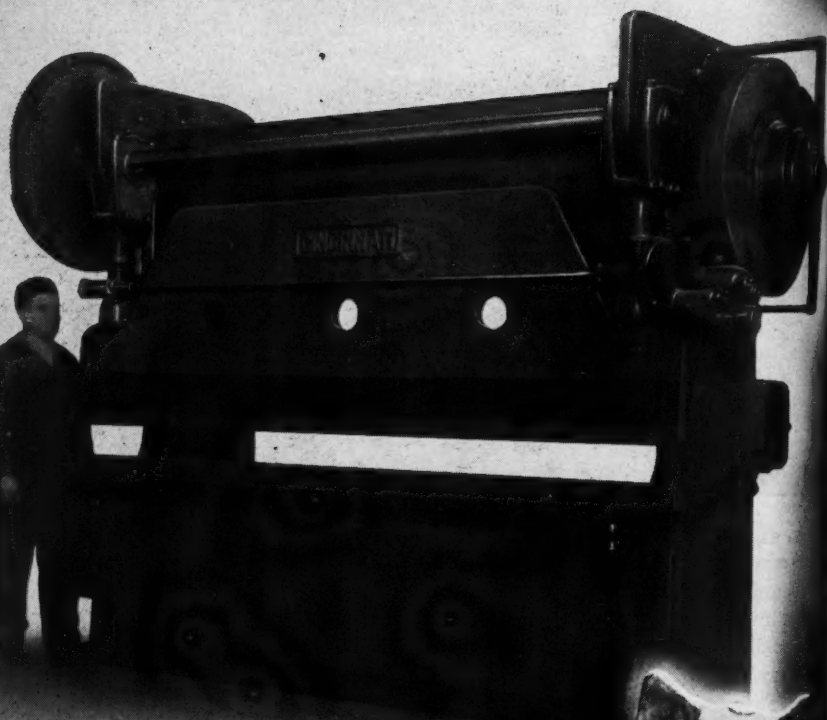
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Press Tool Design

In this article the author takes up details of construction and the operating methods of the lancing, bending, and hubbing type of metal stamping die.

By C. L. SZALANCZY

Tools and Equipment Department, Westinghouse Electric and Manufacturing Company

FREQUENTLY in the design and construction of metal stamping dies a number of simple operations are combined into a single tool of the combination type to produce a completed piece of work at one stroke of

outside diameter and has a $\frac{5}{8}$ -in. center hole. There are two $\frac{1}{8}$ x7/32-in. lugs pierced and bent over to 90 deg. It also has a hub that is $\frac{3}{8}$ -in. diameter on the bottom and 3/16-in. diameter at the top. The lancing,

bending and hub forming operations are all performed in the tool at the same time.

The original blank should be produced by a progressive type of stamping die that punches out the center hole and the small hole for starting the hubbing operation, and blanks out the piece. Fig. 2 shows the design of the combination die that is used to produce the blank illustrated in Fig. 1.

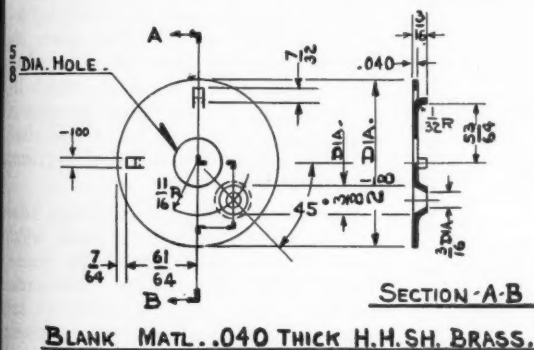


Fig. 1—Drawing of the Blank.

the punch press. This type of a tool should not be made when there is only a small number of pieces to be made, but if there is a sufficient number of such parts in demand to justify the building cost of the tool, a combination die may be designed and constructed to produce it. In this article a combination tool that performs three operations is illustrated and described.

Figure 1 is a drawing of a blank that is made of 0.040-in. thick half hard sheet brass. The blank is $2\frac{1}{8}$ -in.

Part A of the die indicates the punch and die shoes, upon which the tool is assembled. These shoes may be purchased or made round and burned out of hot rolled steel plates, 2 in. thick. The top and bottom surfaces must be slab-ground. The outside of the shoe may be turned smooth on a lathe, although if they were burned out carefully they may be left that way. The shoes must be equipped with guide or leader pins and bushings for aligning the upper and the lower parts of the die correctly.

The standard commercial die sets are already equipped with leader pins and bushings. Unless the shop is used to making its own die shoes and has the necessary jigs to set guide pins and bushings quickly and correctly, the commercial die sets will be found the best and also the least costly. Punch shoes may be ordered with or without the punch holder stem. This type of tool requires a holder without the stem. The upper shoe should be not less than 2 in. in thickness.

A 4-in. diameter opening is machined down $\frac{1}{2}$ in. deep to accommodate the punch stem B. This stem is turned out of round hot rolled steel stock. The stem part is either $1\frac{1}{2}$ -in. or 2-in. diameter, depending on the punch press. There is a $17/32$ -in. diameter clearance hole down through the center. The $\frac{1}{2}$ -in. diameter stub steel knocker pin C is guided through the clearance hole. This pin has a shoulder on the lower end and it fits into the hole in the knockout disc D, where it is held fast by peening the pin over on the bottom of the disc D.

The knockout disc D is made from round hot rolled steel, sawed from bar and ground on top and bottom to assure a good setting for the three stub steel knock off pins E. These pins are shouldered and peened over in the same manner as the pin C. Care should be taken that all three pins are of the same length so they all bear alike on the blank when stripping. The knockout disc D moves in an opening under the punch stem. This opening is $\frac{3}{4}$ in. high, which allows about $\frac{3}{8}$ in. movement.

The die-raising plate, which is made from hot rolled steel and slab-ground on top and bottom is shown at F. This plate is set on the bottom of the upper shoe. A $\frac{1}{8}$ -in. deep undercut is provided into which the die G is placed. The die is made of good grade tool steel. The holes for the

punches which pierce the two lugs are filed in, and the hole for the hubbing is profiled in position.

After the center hole and the necessary dowel pin and mounting holes have been finished, the die is pack hardened to 85—90 scleroscope. The hubbing hole has a small radius where it comes in contact with the blank material to prevent it from shearing off. The same condition exists at the back or the bending end of the two lug-piercing holes. The die is tapered off at an angle on the outside, both as a safety feature and to facilitate loading and unloading the tool.

Two $5/16$ -in. dowels align the die, raising plate and the upper shoe, while three $\frac{3}{8}$ -16 fillister head screws hold the entire upper die assembly together permanently. The lower die shoe is recessed $\frac{1}{2}$ -in. deep to admit the punch holder plate H, which locates and holds the three punches in place. It is made of hot rolled steel, turned on the outside and slab-ground on top and bottom.

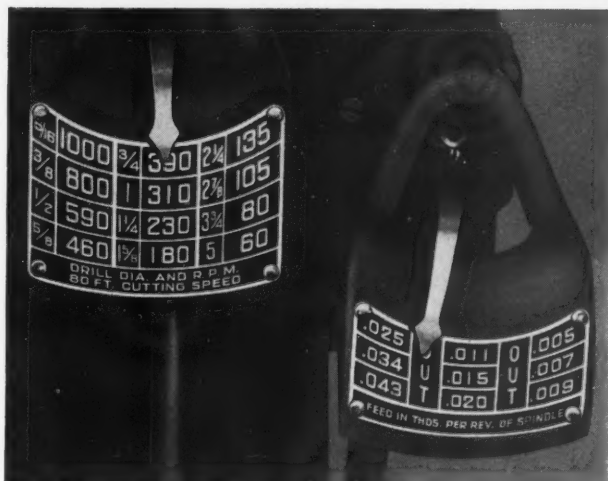
The plate has three clearance holes drilled clear through it into which the stripper springs I are placed. These springs are a commercial product ($\frac{1}{4}$ -in. outside diameter), and are provided to allow free movement to the special socket head stripper screws that pass through them. The stripper screws are marked J in the illustration. It is called to the readers attention that the body of the screw is larger than the screw end. Thus, when the screw is tightened against the stripper, it locks itself and cannot work loose when the die is in operation.

The stripper K is made of hot rolled steel, slab-ground on the top and bottom. The holes which the three punches and the center or locating pin go through are made to a sliding fit. Three $5/16$ -in. 18-thread holes are drilled and tapped in correct

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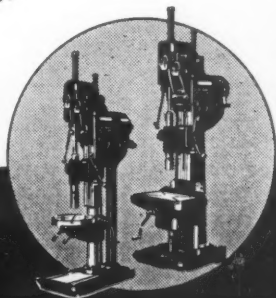
The speed plate at the left shows at a glance the 12 spindle speeds provided progressively from 60 to 1000 r.p.m. on the 24" and 28" machines. On the 21" machine, 9 speeds are available.

- At the right is shown the feed plate which on the 24" and 28" machines provides 9 rates of feed from .005" to .043" per revolution. On the 21" machine 4 rates of feed are provided.

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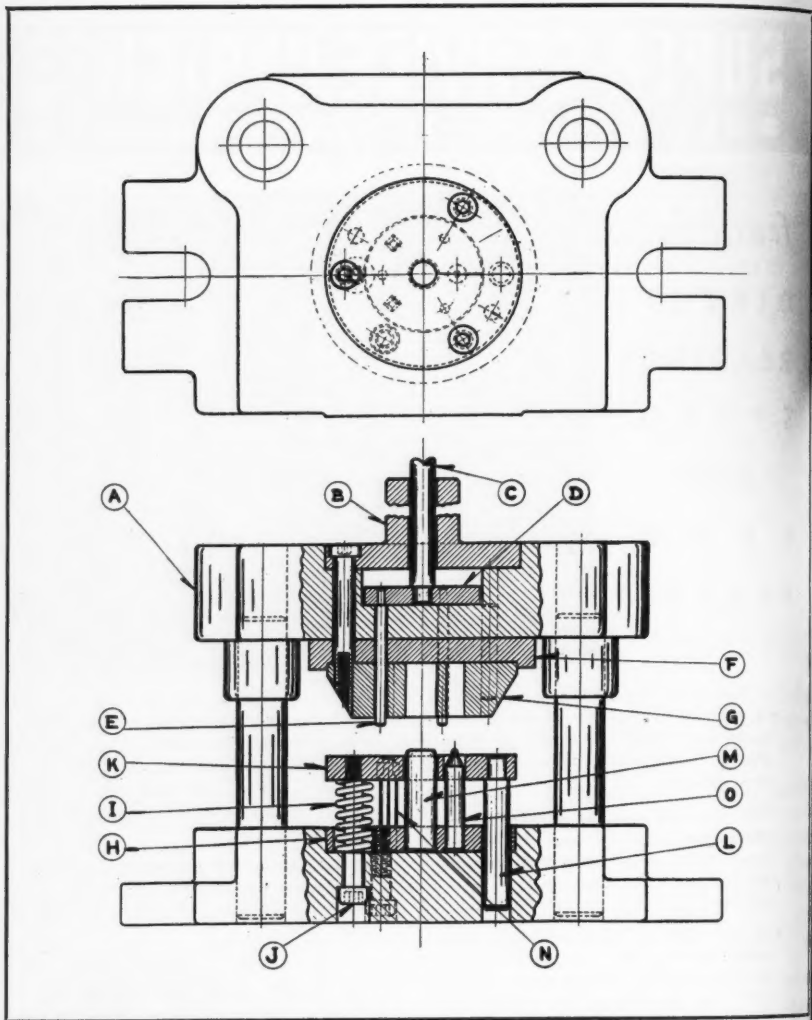


Fig. 2—Drawing showing Design of Combination Lancing, Bending and Hubbing Die that Produces the Blank Illustrated in Fig. 1.

position for the stripper screws. Three $\frac{1}{2}$ -in. diameter stub steel pins L are turned down to $\frac{3}{8}$ -in. diameter at one end and are hardened to 40-45 scleroscope on the large end. The small end is inserted into the stripper and

is peened over. The top surface where the peening was done is then ground smooth so that it will not mark the blank when pressure is applied.

These pins have two definite duties to perform. First, they take some of

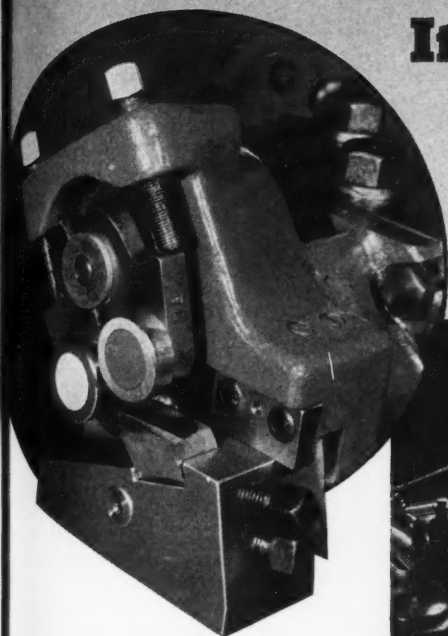
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the strain off the punches by acting as guide pins, and then, the final setting of the hub is done directly on the pins when they come to rest on top of the bolster plate that has been anchored to the punch press table.

The locating pin M is made from stub steel. The upper end is finished

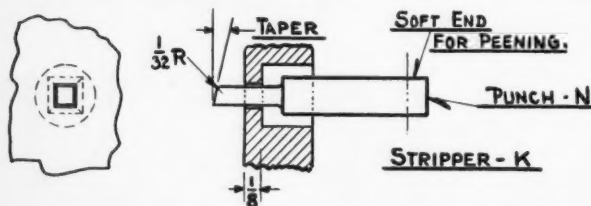


Fig. 3—Lance and Bending Punch and a section of the stripper.

0.003 in. smaller than the $\frac{5}{8}$ -in. center hole in the blank, and has a taper to facilitate the locating of the blank. The pin should be hardened to resist wear. The pin M is press fitted into the punch holder plate. The punch plate H is fastened to the lower die shoe with three fillister head screws and two $\frac{1}{4}$ -in. dowels keep it from moving out of alignment with the upper assembly of the die.

The two punches N that perform the lug-piercing and bending operations are made from tool steel, and are ground to a press fit size to suit the opening made for them in the punch holder plate H. Note that the working end of the punch is made short and stubby so as to reduce the breakage hazard. The punches are hardened to 68-73 scleroscope and the end that fits into the punch plate is drawn back to about 35-40 scleroscope so that it may be peened over to prevent the punches from pulling out when stripping the formed blank.

Another feature of this soft end on the punch is that it acts as a cushion and impedes the punch from working itself into the punch shoe, which would happen in time if it were left

hard. In Fig. 3 the punch is shown as it passes through the stripper. The stripper is bored out to leave only $\frac{1}{8}$ in. at the top for guiding the punch. If it were not made in this manner, the punches would be too frail and would fracture and break. This view also shows how the punch is ground back at an angle on the top with a small radius on the non-cutting end to prevent the blank material from being sheared off.

The hubbing punch O, Fig. 4, is of stub steel and has the required angle turned and ground

on the upper end to form the hub in the blank. The small round lead should be about $\frac{1}{8}$ in. long and radiused on the top to aid in locating the blank. This punch is hardened in the same manner as the previously described punches N.

When the die is in operation and the press ram is up in open position, the stripper K is $\frac{1}{8}$ in. down from

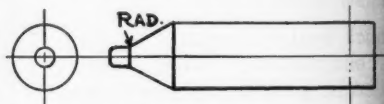


Fig. 4—Hubbing Punch O.

the top of the locating pin and the hubbing punch. The blank material is placed into position over the locating pin and hubbing punch. As the press ram carrying the upper die structure comes down, the knockoff pins engage the blank material first.

By this time the hubbing punch has started to form the hub and the blank material is held between the stripper and the die. The lancing punches come in contact and cut the three sides and as the press ram continues

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downward, the lugs are bent upward and are finally set to 90 deg. as the press reaches the bottom of its stroke with the stripper pins L resting on the bolster plate.

On the up-stroke of the press, the springs force the stripper upward. The blank will naturally stick in the upper part of the die and will remain there until the knockoff pins eject it back onto the stripper. The loading and unloading should be done with special tweezers that are supplied to the press operator to eliminate accidental injuries to the fingers.

Landis Threading Equipment. The purpose of this 16-page bulletin is to present Landis equipment suitable for the requirements for thread cutting in railroad shops and in those associated metal working industries whose products are essential to the safe and efficient maintenance of the rolling stock of railroads throughout the world. Equipment described and illustrated included Landis Chasers, Landmaco Threading Machines, Landis 1½-In. Reverse Taper Die Heads for threading tapered head crown bolts, timing attachments, work stops, Type F Landmatic Heads 32 AX Landmatic Heads, Lanco Heads, "Little Landis" Pipe Threading and Cutting Machines, Landis 4, 6 and 8-In. Pipe Threading and Cutting Machines, and Landis ¾ and 1-In. Automatic Forming and Threading Machines.

Copy free by addressing Landis Machine Company, Waynesboro, Pennsylvania.

Manual of Gear Design—Section 3. By Earle Buckingham. 172 pages, 8½ by 11 inches. Published by The Industrial Press, 148 Lafayette St., New York. Price, \$2.50.

Section 3 of the "Manual of Gear Design" contains the formulas and tables required in solving all kinds of helical and spiral gear problems. The term "helical gears" has been applied to parallel-shaft drives, and the term "spiral gears" (in accordance with common usage) to non-parallel non-intersecting shafts.

Section 3 conforms in size and general appearance with the previously issued Sections 1 and 2, Section 1 consisting of mathematical tables for general use in gear design, and Section 2, of formulas and tables for designing spur

and internal spur gears.

Section 3, like Section 2, begins with definitions of various gear terms and gives the symbols or notation used in the formulas throughout the book. All formulas are accompanied by examples showing their practical application. Time-saving tables constitute another important feature. These tables eliminate calculations either by giving directly the proportions of various combinations of gears and pinions or by giving data representing partial solutions to many kinds of gear problems.

This book not only deals thoroughly with the design of helical and spiral gears, but includes considerable information and data about the cutting of such gears by hobbing, shaping, and milling. Even change-gear calculation is included, as required in connection with or without a differential mechanism.

The designer who needs at times, in addition to the ordinary standard formulas, special formulas and data will find this book invaluable. His problem may be to design a transmission having a pinion with a very small number of teeth; or internal helical gears; or planetary drives of the simple or compound type. Possibly there is a question about contact ratio, under-cutting of teeth, interference, end thrust, bearing loads, tooth forms adapted to helical and spiral gears—Section 3 covers these and many other important elements of helical and spiral gear design, including, of course, herringbone gears.

Information on the standard tooth forms adapted to milled, hobbed, and shaped helical gearing is given, with formulas and examples showing practical application in all cases. The graphical method of determining end thrust and bearing loads is illustrated, and the section on spiral gears features a simple graphical method of especial value when the mathematical solution is indeterminate or must be solved by trial. The sections on power-transmitting capacity deal not only with dynamic loads and beam strength, but also with loads limited by wear.

This book is restricted entirely to working information and data, and a complete index enables the user to locate readily any formula or tabulated data required. This latest addition to the "Manual of Gear Design," like its two predecessors, is approved by the American Gear Manufacturers' Association. It represents the accomplishment of a man whose national reputation as a gear designing expert is based upon the results he has achieved in analyzing and solving many different classes of gear designing problems.

1937

November, 1937

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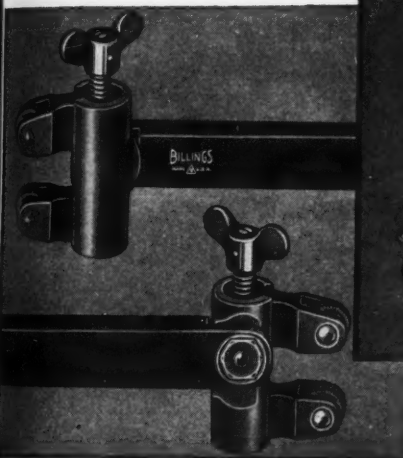
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Section thru Head Showing Safety Eye Construction

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Generations ago when an apprentice was buying Forged Tools, the advice of the Old Timers was "if it's a Billings you buy it Son, they have always served me well".

Today it's the same with more emphasis—"Billings Shop Tools stand the gaff."

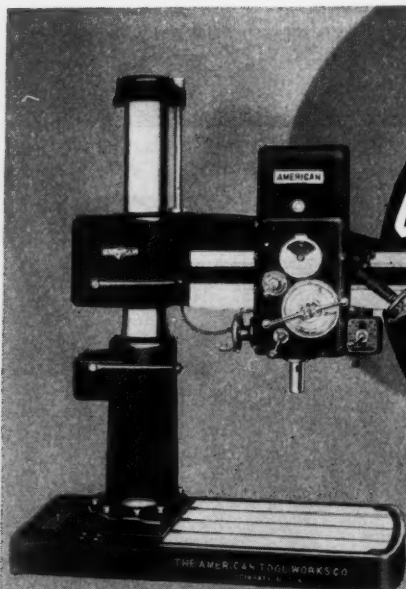
Write for the new pocket size catalog and pick out the Shop Tools and Wrenches you need—remember each has the Billings guarantee.

Lathe Knurling Tools. Knurls and Pins tool steel hardened and tempered. See catalog page 32. Swivel adjustable on shank. Thumb nut for knurl size adjustment—self centering.



New Catalog
Pocket Size
Write Dept. "O"

Billings Vitalloy Tools--Longer Life in Forged Tools



Lost Time
**CUT TO
THE BONE**

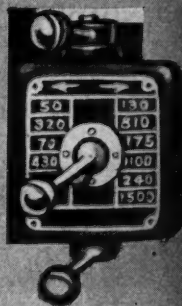
NO time lost in speed changing. No confusion in securing desired speed. The simplest and fastest speed control is offered by the "American" Hole Wizard. No more reading of confusing speed plates and juggling of levers to secure desired speeds.

The Hole Wizard speed change is direct reading—2 levers—one ball shift and one 2-position back gear lever on the 12-speed and only one ball shift lever on the 9-speed machine.

Simply throw the lever or levers to the selected speed shown on the plate—that's all there is to it.

The bottom lever shown on the illustration is the motor control lever (directly under the speed control lever—the most convenient place for it) which starts, stops and reverses the spindle.

On work requiring frequent speed changes the Hole Wizard holds a tremendous advantage.



**DIRECT READING
INSTANTANEOUS
Speed Control**

THE AMERICAN TOOL WORKS COMPANY
Lathes Radials Shapers
CINCINNATI, OHIO, U.S.A.

1937



THE ROTOR D-3 GRINDER

Here is an eight-inch Grinder that has "what it takes", plenty of power, high load speed, steady every-day hogging performance.

A TEN DAY TRIAL WILL CONVINCE YOU.

THE
ROTOR

AIR TOOL
COMPANY
CLEVELAND, OHIO

Safety in Crane and Elevator Operation

BY R. A. SHAW

Safety Engineer, Murray Corporation
of America, Detroit, Michigan

IN MANY plants of the type represented by The Murray Corporation of America, our modern highly-organized progressive system of manufacturing is dependent to a large degree upon the efficient functioning of the cranes and elevators involved. It seems strange, therefore, that the equipment referred to is the least understood by the average foreman or superintendent. The fact is, however, that the maintenance of such equipment is usually delegated to some specialist. The superintendent or master mechanic may be thoroughly familiar with all other necessary tools, machines, and conveyors, but he is satisfied to let others worry about the cranes and elevators.

Inasmuch as the efficient operation of the plant so often is dependent upon such equipment, it would seem imperative that every machine shop executive be familiar with the mechanical details, operation, and care of these items. Considering the heavy tasks that often are imposed upon them, the cranes and elevators comprise a constant potential threat to production schedules. The average machine shop executive has usually served his apprenticeship at machines of the type under his supervision, but only in rare instances has

Cranes and elevators, by their very nature, are constant potential sources of danger. Proper regulations will reduce casualties to the minimum.

he ever served any time on overhead cranes or elevators. Occasionally, therefore, he receives a jolt which focuses his immediate attention upon this equipment.

Modern cranes and elevators are designed with an eye to safety as well as efficiency, and mechanical safeguards of various types are employed. Such mechanisms need checking at regular intervals to insure proper adjustment. However, in spite of all precautions accidents will occur in and about such cranes and elevators, and the sad part of it is that these accidents are usually of a severe nature. In many cases the equipment can be blamed, but the human element must always be taken into consideration.

Of those cases where it appears that the equipment can be blamed, 90 per cent are traceable to lack of proper inspection or failure to check the operation of the equipment at regular intervals. The old slogan "A tap saves time" is certainly true. The railway traveler feels a sense of security when he hears the tap-tap of the inspector as he taps the wheels with a hammer to make sure that they are sound. It is impossible to test cables by this method, but there are other and just as efficient methods

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The Fastest Manual Small Tapping Known to the Art

Ettco-Emrick **MULTIPLE TAPPING**

HIGH PRODUCTION SENSITIVE SMALL TAPPING PRESENTS THE SAME SAVING POSSIBILITIES AS ANY OTHER IMPROVEMENT.

WHAT HAVE YOU DONE ABOUT IT ?

Multiple heads, the Ettco way, are a new proposition.

If you have thought of multiple tappers as a few taps, precariously sticking out in the air—forget it.

Ettco heads are engineered for the job. The work, work holder and head are properly tied together. The hole line up is perfect.

The results are better holes to a better gage fit and with far less headaches than with ordinary single tapping.

Capacity No. 2 to 1/4" taps.

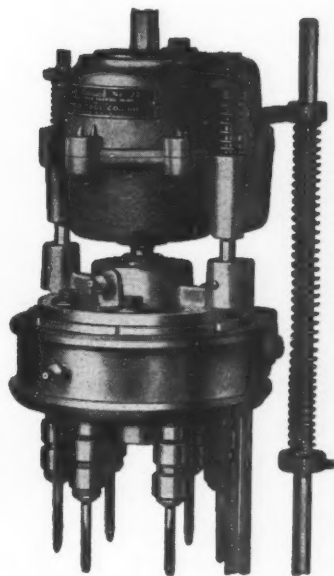
IF YOU WILL SEND US A DRAWING WE'LL GET YOU OUT A STANDARD QUOTATION—TELL YOU THE PRODUCTION AND GIVE YOU A GOOD IDEA OF HOW WE WILL ENGINEER THE JOB.

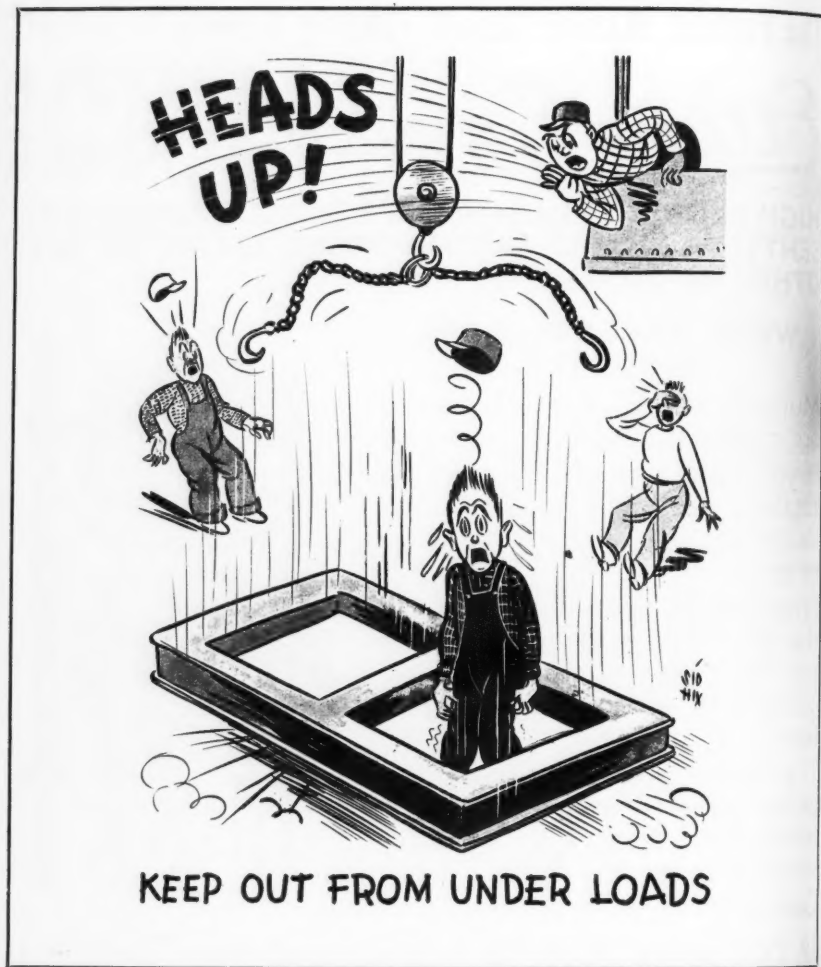
Drop us a line for our catalog.

ETTCO TOOL CO.

594 JOHNSON AVE.

BROOKLYN, N. Y.





Safety Posters help to impress the necessity of safety on the minds of employees.

which can be used to discover when a change of cable is necessary. However, regardless of the supposed safety of crane cables, the first rule in a shop where an overhead crane is used should be that all employees must keep out from under crane loads.

When a cable on an elevator breaks,

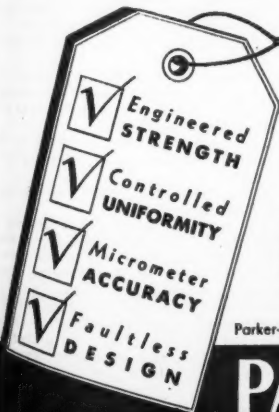
the elevator starts to fall with constantly-increasing momentum and at a given speed a safety dog is thrown out which engages an auxiliary "safety" cable. If the dog and safety cable have been inspected regularly and are in good condition, the elevator will be stopped within six feet.

FROM THE PARKER-KALON LABORATORY



**COMES A
higher standard
of quality
IN SOCKET SCREWS**

It took over two years of intensive research and development work; and an investment of \$250,000 in new laboratory equipment to produce Socket Screws good enough to uphold the Parker-Kalon reputation. When you get samples of the new Parker-Kalon Cold-forged Socket Screws, you will agree that the result fully justifies the expenditure of effort and money. Judged by any standard, these new Screws will measure up to your ideas of what good Socket Screws should be. Send for bulletin that gives full details and free samples of the types and sizes you use.



Parker-Kalon Corporation, 198 Varick Street, New York

Cold-forged **PARKER-KALON
SOCKET SCREWS**

The whole point of issue is whether or not the plant executives have recognized the importance of having this inspection made at regular intervals.

In too many cases the importance of special training for crane and elevator operation is under-estimated, and the idea prevails that one as little skilled as the shop "handy man" can

the fact that no one is allowed to operate such equipment without first having obtained a permit signed by both the Plant Engineer and the Plant Safety Engineer. The permit occupies one page of a book of rules with which the prospective operator must familiarize himself before he can obtain the permit. The rules for crane operation are given herewith:

FORM 355

AUGUST 1, 1934

ELEVATOR OPERATORS' INSTRUCTIONS

STUDY CAREFULLY AND KNOW
EACH RULE

SIGN PERMIT AND CARRY
AT ALL TIMES



THE MURRAY CORPORATION
OF AMERICA

INDUSTRIAL RELATIONS
Department of Safety

Front cover of Elevator Operators' Instruction Book. This book is 3x4½ inches in size; small enough to be carried in the pocket at all times. The inside back cover is the operator's permit.

operate such equipment—at least in an emergency. And too often such judgment has resulted in a bad accident, if not death.

The importance with which safe and efficient crane and elevator operation is regarded by The Murray Corporation of America is indicated by

1. ALL LEVERS are to be in neutral position when power is off.
2. UNSAFE CONDITIONS, both on the floor and on the crane must be reported immediately to the foreman or to the Safety Department.
3. OVERLOADING OF CRANES is prohibited. Check all questionable loads before lifting.
4. BRIDGE FOOT BRAKES must be checked at the start of each shift.
5. APPLY FOOT BRAKES gradually. Excessive strains on crane parts will be avoided in this manner.
6. CRANE GUARDS must be in place; especially sweep guards on wheels.
7. BUMPERS on both trolley and main girder track should not be bumped hard. Keep Crane Speed under control at all times.
8. SIGNALS FOR LIFTING must be taken from the hooker, except in the power press department where the press control operator will signal. Abide by signal code on Page 4.
9. HOOKING must be done safely. The crane operator is equally responsible for hazards when lifting.
10. SAFETY OF MEN on the floor is the crane operator's responsibility as well as the hooker's. Keep workmen away from loads in motion. Report all violators.
11. STEEL BUNDLES must be securely bound before lifting.
12. CABLE ANCHOR CLAMPS must not be put under strain at any time. Keep enough cable on drum, when required, to make lifts from below floor level.
13. TOOLS and other materials must be put into the tool box and not left lying loose on the crane.
14. PULL MAIN SWITCH when leaving crane for any reason.
15. GOGGLES must be worn when testing or removing fuses. Be prepared for a flash.
16. CRANE HORN must be used to warn workmen on the floor of approaching loads. Hooker must precede the load.
17. TRACK WALKERS will be dismissed. Use the landings when getting off or on cranes.
18. CLAMP BUMPERS must be placed between live crane and workmen on track and between live crane and crane used by workmen.

MAINTENANCE.

19. DO NOT PUSH other cranes, except in the presence of the foreman or inspector.
20. PLUGGING BY REVERSING OF the bridge

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Literature

THE FIBRO FORGED SCREW PEOPLE

No. 22



The New
Side-Kick
of the No. 33

List Price \$1.00

introducing No. 22 — a New

HOLO-KROME Socket Screw WRENCH SET

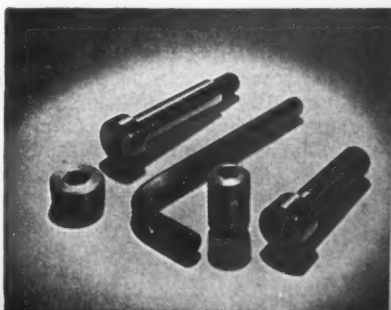
A compact, black, crackle finished, metal box (5x2 $\frac{3}{4}$ x $\frac{5}{8}$) containing 9 Holo-Krome "File Hard" Surfaced Socket Screw Wrenches. They fit all hex type Hollow Set Screws from No. 8 to $\frac{3}{4}$ " diam. incl.—all Socket Head Cap Screws from No. 4 to $\frac{1}{2}$ " diam. incl.—all sizes of Socket Head Stripper Bolts from $\frac{3}{8}$ " to $\frac{3}{4}$ " diam. incl. and all sizes of Hollow Pipe Plugs from $\frac{1}{8}$ " to $\frac{1}{2}$ " diam. incl. The No. 22 will fit into your tool box. The cover of the metal box has regular hinges and reinforced corners—You'll like the box and the Set of Wrenches.

THE HOLO-KROME SCREW CORP.
Hartford, Conn., U. S. A.

THE HOLO-KROME SCREW CORP. Hartford, Conn., U.S.A.

SEND TO _____
Name _____
Address _____
Company _____

Literature describing Wrench Set No. 22 and No. 33



motor is prohibited. Use foot brake to slow up or stop.

21. BURNED CONTACTS are avoidable. Excessive amount of maintenance due to burned contacts will result in disciplining of crane operator.
22. DRAGGING OF CHAINS is prohibited. Keep a constant watch for chain defects.
23. LOCK MAIN SWITCH when making repairs, oiling, or inspecting.

EMERGENCY.

24. LIMIT SWITCH on the hoist is for emergency only.
25. Operating Hand must remain on the hoisting lever while lift hoist is in motion.

CLEANLINESS.

26. DIRTY CRANES will not be tolerated. Operators are held responsible for condition at all times.
27. SPITTING ON FLOOR of cab or over rail will result in disciplining of operator.

CRANE OPERATORS PERMIT

Name.....

Date..... Badge No.....

This is authority for the above named person to operate a crane in the plants of The Murray Corporation of America. This permit must be carried at all times while operating crane. Hookers are to follow these rules.

.....
Plant Engineer

.....
Safety Engineer

Crane Operator's Permit. Size, 3 x 4½ inches. No one is allowed to operate an elevator without first obtaining a permit.

Note particularly rule No. 23. How many bad accidents have occurred because the main switch wasn't locked while the crane operator was oiling or inspecting the mechanism, perhaps creating the impression that there was no one on duty? Rule No. 17 is important to maintenance and construction men.

It is important that the crane mechanism be inspected at regular intervals. Cranes are built for strength, and everyone, from the top executive down, is too often prone to take it for granted that nothing serious can happen to a crane. However,

the fact that it can happen was demonstrated recently in a near-by steel mill.

The crane hooker had completed hooking the tail chain to a ladle of molten slag suspended from the crane hook, and had stepped away to a distance of perhaps 30 feet when the ladle dropped. The hooker suffered multiple third degree burns on both legs, his back, and his right arm as he strove frantically to get away.

Sadly enough, the accident was that it was not his fault. The ladle had dropped because of the breaking of

a 4¼-inch shaft in the hoisting mechanism. Had an inspection been made at regular intervals, it is likely that the defect in the shaft would have been discovered.

To insure, as far as possible, the safety of all cranes, the cranes are inspected at regular intervals which are determined by the amount of service to which the cranes are subjected.

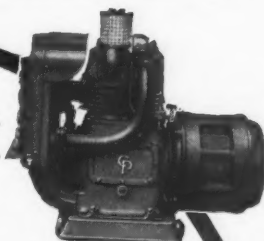
Inspectors are required to check the condition of cables, foot walks, toe boards, and the capability of the operator. The operator is required to show his permit and to answer any questions regarding his manner of operating the crane that the inspector may ask.

When the crane must be withdrawn from service in order to make inspections or repairs, a report on the inspection and the work done must be made by the inspector to the maintenance superintendent.

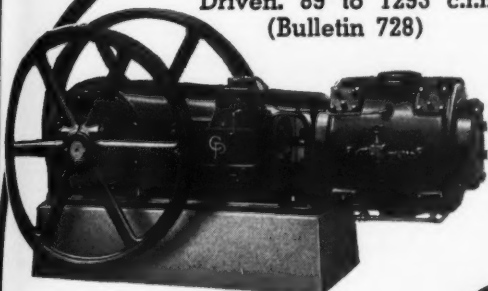
Elevators are also inspected reg-

AIR COMPRESSORS

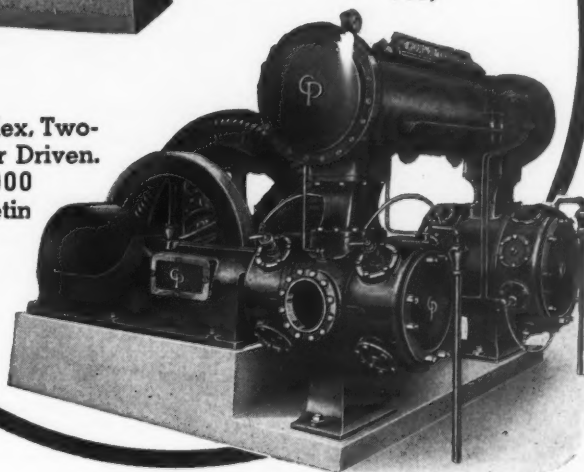
(Below)
Type T Single-Stage, Belt-Driven. 89 to 1293 c.f.m.
(Bulletin 728)



(Above)
Type P Two-Stage, AIR-Cooled. 85 to 382 c.f.m. (Bulletin 759)



(Right)
Type O Duplex, Two-Stage, Motor Driven. 350 to 10,000 c.f.m. (Bulletin 725)



A size, type and drive to meet every requirement.

Write for Bulletins.

CHICAGO PNEUMATIC TOOL COMPANY

6 EAST 44th STREET, NEW YORK, N. Y.

CHICAGO PNEUMATIC

Form 608

 THE MURRAY CORPORATION OF AMERICA
 ELEVATOR SAFETY INSPECTION

Date _____

 Plant # _____ Bldg. # _____ Elevator # _____
 Operator _____ Permit _____ Clean--Yes _____ No _____

PENT HOUSE	Engine Fastenings Bearings Automatic Belts Packing W. Gear Other Gears Slack Cable Drum Worms Brake Keys Thrusts Grease cups Drum Cushions Vibrator Sheave Hazards Motor Alignment Brushes Bearings Commutator Controller Reverse Line Automatic Magnets Contacts and Circuit Br'kr Wiring Resistance Fuses Switches Insulation Floor Stop
CAGE	Car Floor Crosshead Cab Wainscote Cable Fastenings Guide Shoe Liners Car Gates Gate Switches Push Buttons Electric Lock Slack Cable Screening
HATCHWAY AND ACCESSORIES	Guides Guide Fastenings Counterweight Guide Oilers Buffers Equalizers Limits and wiring Door Switches Locks Doors Door Hangers Enclosure Gates Gate operators Center Pull Cond. Cables Fastenings
GOVERNOR, SAFETY EMER- GENCY. AND CABLES	Governor Governor Cable Weight Switch Safety Dogs Shafts Keys Cable Hoist Drum Car Cwt O.P. Cable
SIGNALS AND LIGHT	Annunciator Threshold Light Flash Light Car Light Annunciator Wiring Other Wiring Machine Light Push Buttons
CAR CONTROL	Car Switches Tiller and Lock Crank
GATES	Gate Gate Ropes Operator Devices Hangers Enclosure
HATCH AND O.H. WORK	Beams Sheaves Shafts Bearings Fastenings Is Fit Penthouse Machine Room Clean Spring Bumpers
DID YOU TEST	Hatch Limits Circuit Breaker Slack Cable Safety Automatic Governor Yes No
PENTHOUSE APPROACHES	Ladders Landings Stairways

Notified: _____ Mr. _____ of conditions.

Note: Check after each item found in condition you consider safe for satisfactory operation. If not in good order, mark X after each item and report fully on the back. Make a separate report for each elevator. (See other side.)

Maintenance Inspector _____

Safety Inspector _____

Check Sheet used by elevator inspectors. Size, 8½ x 11 inches.

ularly and their condition reported by the inspectors. To insure that no item is overlooked, the inspector is required to check off each detail of the mechanism as listed on the sheet shown here. He checks each item as

he examines the mechanism and any parts are found in need of attention, he reports fully on the back of the sheet.

Emergency safety dogs on elevators have been found stuck due to paint

HELPING GOOD MECHANICS DO BETTER WORK



**BLACK & DECKER SANDERS SOLVE
YOUR SURFACING PROBLEMS**

WHETHER your surfacing operations are intermittent, or on a continuous production schedule—whether they involve surfacing metal, wood, stone, concrete, tile—there's a Black & Decker Portable Sander that will improve production time and results. The popular 7-Inch Special Sander (illustrated) is a standard production model with a wide variety of applications. Also there is the 7-Inch Junior for "odd-job" use; the 7-Inch Heavy Duty for high speed mass production; the 9-Inch Standard for large areas; and the extra heavy duty Electric Surfer for the most severe types of surfacing work. Ask your Black & Decker Jobber for a demonstration, or write for catalog. The Black & Decker Mfg. Co., 720 Pennsylvania Avenue, Towson, Maryland.

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PORTABLE ELECTRIC TOOLS

The drum shaft may stick due to rust, creating a 100 per cent unworkable condition of an otherwise efficient emergency device. When this occurs, it can be traced directly to lack of proper inspections.

The worm drive is seldom checked, and demands removal of the thick

SIGNALS TO CRANEMEN



gear oil before inspection. Inspection twice a year where the elevator is used more or less continuously is usually sufficient.

Elevators operating without door or gate contacts are a demonstration of extreme neglect on the part of the management. Such violations are usually traceable to some over-busy foreman who is willing to run the chance rather than hold up the use of such equipment until necessary repairs are finished. Compromising with safety is poor practice.

Elevators, especially of the freight type which are used to carry employees, should have a white line painted on the vertical sides two feet back from the front gate. The operator should refuse to operate the elevator unless all persons on the elevator are behind this safety zone line. Constant attention of the operator as to this matter should be required.

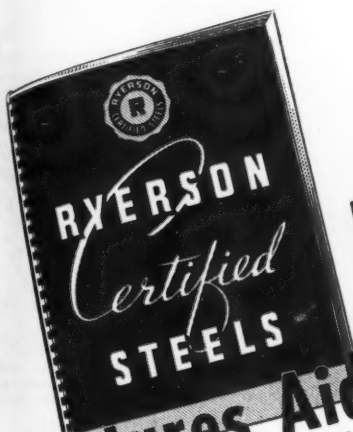
The best place for stretchers in a large and busy plant is on the side of the elevators, except those of the passenger type. When stretchers are needed, all employees will remember that they have seen the stretchers on the elevators.

Each elevator operator is required to know every one of the 33 rules in the book of Elevator Operators' Instructions, and must have a designated permit before he is allowed to operate an elevator. The rules are as follows:

1. Emergency call, one long and three short rings. This call is to be used for fire accidents only. Report anyone abusing the call.
2. Never carry passengers when gasoline being carried on the car.
3. The stretcher must not be removed from the elevator permanently. See that it is turned to the hanger ready for future use.
4. Before loading machinery, consult the foreman. Be sure weight of load does not exceed capacity of elevator. Never overload.

SAFETY ESSENTIALS.

5. Before closing elevator doors see that everything is clear.
6. Never start your elevator until all passengers are back of the danger line. The white line must be repainted regularly.
7. Do not remove hand from lever control while elevator is running. Keep hand on lever so that elevator can be stopped instantly in case of accident.
8. Horse-play will not be tolerated.
9. On passenger elevators, be sure doors are closed before operating.
10. Never load or unload elevators equipped with hand rope control locks unless in neutral position.
11. Employees will not operate elevators without a permit. All violations are to be reported.
12. Never pull a truck toward you; push. This will eliminate accidents due to backing of trucks.
13. Lock switch when steam fitters or other employees are in elevator-pit.



NEW BOOK

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• Ryerson has always carried only the higher quality steels. Now, after years of planning, they bring you Certified Steels—steels of known quality—with year after year uniformity. Special quality and service features help users secure best results. For instance, alloy bars are of selected chemical analysis. They are tested for heat treatment response. Complete data on every bar is sent the customer to guide in treating the steel. We believe you will be interested. Write for booklet G-8 which tells the complete story. Joseph T. Ryerson & Son, Inc. Plants at: Chicago... Boston... Milwaukee... St. Louis... Cincinnati... Cleveland... Buffalo... Philadelphia... Detroit... Jersey City.



RYERSON *Certified* STEELS

14. Pull main switch when general repairs are to be made and see that same is locked open.

MAINTENANCE.

15. Do not operate elevator when gate contact is out of order. Call Maintenance Department at once. Elevators must not be operated when gates are up.
16. Never overload elevator. Check capacity figures on all trucks and estimate loads. YOU are responsible for accidents due to overloading.
17. Elevator screen must always be in place over top and properly adjusted.
18. Under no condition must elevator be operated if gates or fire doors are opening at floors other than where elevator is stopping. Stop elevator at opened space and call for immediate repair from Maintenance Department.
19. Mechanical defect or need of brake adjustment is sufficient cause for stopping elevator for repairs.
20. Indifferent operators will be replaced with others of more courteous and agreeable nature.
21. Never leave elevator at top floor when not busy; return it to main floor. In case of fire, time will be saved.

CLEANLINESS

22. Always keep car clean and painted.
23. Keep floor of elevator clean from grease and dirt.
24. Do not litter sides of elevator with clothing and other materials. Keep elevator neat.

Columbia JFS-Jr. Varia-Speed Control Bulletin. The construction features and operation of the JFS-Jr. Vari-Speed Control, formerly known as the Hi-Eff., are described and illustrated in a four-page bulletin now being issued by the Columbia Vari-Speed Co., Liberty Bldg., Wheaton, Ill. Selection table for the Vari-Speed Control is included. Copy free.

Moraine Handbook of Durex Bearings, published by Moraine Products Division, General Motors Corporation, Dayton, Ohio, tells the story of a special bronze bearing metal, developed in the General Motors Research Laboratories, which has the ability to absorb lubricating oil and to feed it to the contacting surface so as to maintain a protective oil film between the journal and its bearing at all times under load. Durex Bearings are made of powdered metals, briquetted, heat treated and oil impregnated. The metal thus has a porous structure through which oil, applied to the wall of the bearing, is conveyed to the bearing surface. In many cases the original impregnation of oil, which all Durex Bearings receive, is sufficient for bearing lubrication for the life of the machine of which the bearing is a part.

25. Procure clean overalls each week.

SAFETY.

26. Never visit while elevator is traveling. If necessary to obtain information, stop elevator while doing so.
27. Check each end of elevator before starting to see that loads will clear gates or end walls.
28. Safety Type Shoes will protect your feet from trucks or falling material. They are sold at the Employees Store.
29. Do not argue with fellow workmen. Report violators to your foreman.
30. Hollering or throwing anything to attract attention of employees is prohibited.
31. Loads are to be distributed as much as possible in middle of elevator.
32. No one is allowed to lean against or over elevator gates. Report violators.
33. Special attention is necessary when repairmen or insurance inspectors are inspecting the elevator for defects. Lock switch when they are under elevator or when repairs are being made. Follow their instructions.

Accidents on equipment of this nature will be reduced to the minimum if everyone, including the plant executives, lives up to the Safety Rules. No one other than the approved operator should be allowed to operate an elevator or crane without having first procured the required permit.

The control of oil flow through the Durex Bearing wall is dependent upon several factors, among which are (1) density of the bearing metal, (2) porosity of the material, (3) viscosity of oil, (4) temperature, (5) pressure of oil at source, and (6) condition of inner and outer wall surface. These various factors are discussed in detail, the load-carrying ability per square inch of projected bearing area being illustrated by means of a chart. The book is profusely illustrated with cross-section drawings showing typical installations of Durex Bearings and showing the various methods of application. The text is divided into chapters as follows: Durex Structure and Properties, Oil Flow Through Durex Bearings, Load Carrying Ability, Durex Bearings in Machine Design, Typical Installations, Installing Durex Bearings, Press Fits and Clearances, Durex Bearings in Die Castings, Durex Bearings: Sizes, Straight Cylindrical Bearings, Standard Flanged Bearings, Self-Lining Bearings, Thrust Washers, and Irregular Shapes. The book contains 40 pages in color, bound between attractive imitation hammered copper board covers.

Copies free to plant mechanical executives.

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operations the machine will efficiently perform in the tool room. Hob grinding, circular forming tool grinding, staggered tooth gear cutter grinding, internal grinding, surface grinding, radial grinding, cutter and reamer grinding, and so on and so on. Nor have we the space to explain the features of design and why they make the 12" x 28" so popular with operators • Do yourself the favor of learning these things by sending for the catalog. Ask for No. K-137. We've made it easy—simply fill in and mail the coupon below. You'll be as enthusiastic about the Landis 12" x 28" as we are, after you've seen it saving valuable minutes in your own tool room.

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WAYNESBORO, PENNSYLVANIA



You may send catalog No. K-137 which describes the Landis 12" x 28" Universal and Tool Grinder.

Name _____ Title _____

Company _____

Address _____

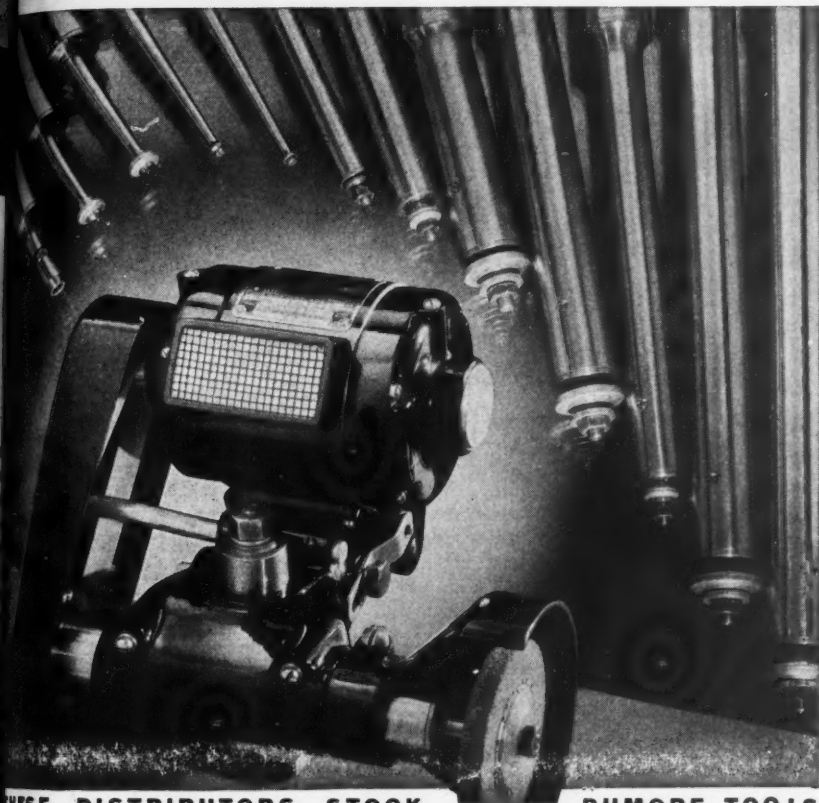
12 IN 1

A whole battery of grinders in one! If you have a Dumore No. 5 Grinder, these quick-change quills can lick a vast variety of tough grinding jobs . . . internally, holes $\frac{1}{8}$ to 18 inches deep . . . diameters down to $\frac{1}{8}$ inch . . . external grinding, of course . . . speeds up to 42,500 . . . and all with accuracy to a tenth (.0001). Multiply your grinding range by adding some or all of this dozen extra quills. Let any of the distributors named below give you the full details and a FREE demonstration.

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If we accept setting of a lathe tool or reading a micrometer as a typical seeing task in the shop, 20 to 30 foot-candles on the working plane is certainly a conservative minimum, based on widely recognized visibility tests. Actually, no rigid minimum can be established. Drill presses, for example, may call for the most critical seeing down within the holes. Internal grinders and boring ma-

chines may require that the light penetrate horizontally to a depth of several inches. Punch presses, turret lathes, gear cutters and the like generally have overhanging parts which block off a large proportion of the light from the points where critical seeing is required. Under these conditions, general illumination levels of 50 foot-candles or more are now being adopted, so that even deep recesses are raised to a detail-revealing level whatever it may be under the circumstances.

Originally, in shops set up for

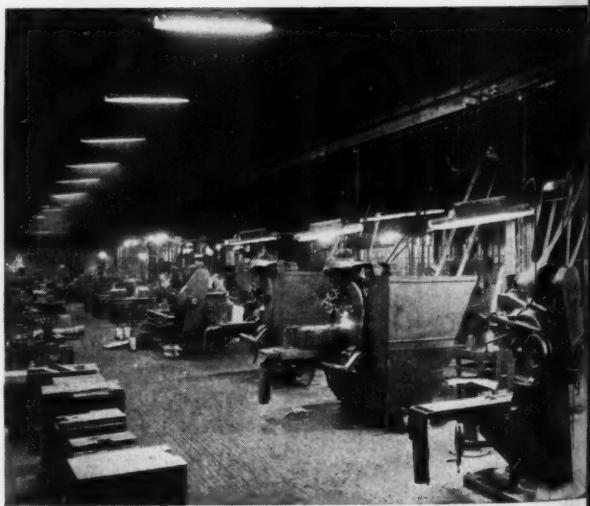


Fig. 1—At the Ladish Drop Forge Company, Cudahy, Wis., general illumination is provided by Cooper Hewitt lamps at a height of 18 ft. In addition, directly above each machine, other lamps are mounted on swinging arms, revealing the detail, yet easily swung out of the way when die blocks are delivered by the crane.

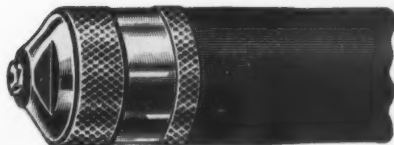
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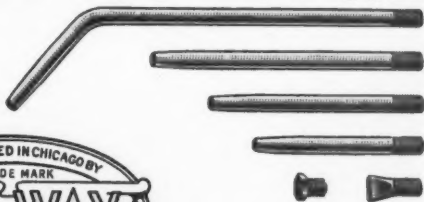
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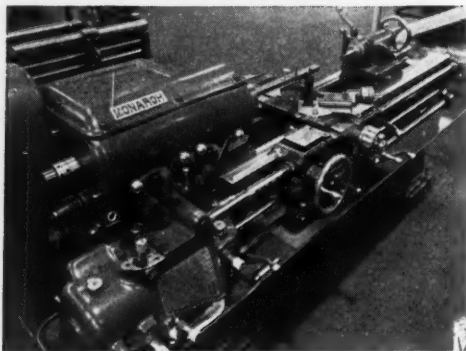


Fig. 3—No floodlights—only the regular shop lighting was used for this photograph at the Monarch Machine Tool Company, Sidney, Ohio. For precision operations here, the illumination level is some 80 foot-candles on the horizontal plane, furnished by high-efficiency mercury lamps.

single-shift operation, artificial lighting was regarded primarily as a means of supplementing the available daylight at vital points. As a result, drop lamps and bracket lamps mounted close to the work frequently became primary light sources for night operation, in spite of their seri-

ous limitations in proper light distribution. Even today, drop lamps and bracket lamps have their place, but not as a means of "saving" on general lighting—as plants who have thoroughly checked their overall costs have discovered.

When a bracket lamp is mounted over the cutting tool on a lathe, or some corresponding location, the illumination directly on the work may be 20 foot-candles or more—apparently fully adequate for the job. However, the brilliance of this small well-lighted area may constitute a serious safety hazard to the operator if the rest of the shop has only a few

scattered overhead bulbs. Once he turns his eyes from the work, the rest of the shop will necessarily seem in semi-darkness. A minute or more may elapse before he can really see well enough to find a wrench or a wiping cloth, or to walk safely down the dimly-lit aisle.



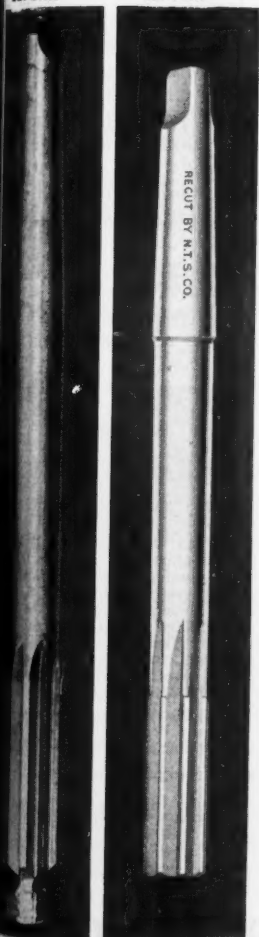
Fig. 4—This section of the welding division in the central overhaul and repair base of the United Air Lines is illuminated by Cooper-Hewitt lamps. High illumination levels of revealing light are one more step in assuring "happy landings".

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In addition, small, concentrated light sources of this type invariably cause reflected glare from bright metal parts. Frequent readjustment of the lamps to avoid shadows is irritating and time wasting. Maintenance costs for cleaning and for replacing damaged bulbs, sockets and leads are always high. Today most production machine tools, particularly those of the automatic or semi-automatic type, do not require any greater visual concentration on the work than they do on gages, adjusting levers, and other controls. These controls are frequently located at the sides or ends of the machine, well out of range of any small drop lamp. They require a uniformly distributed light, adequate in the vertical plane as well as the horizontal, and as free from shadows as possible.

It is safe to say that there is now no common seeing task in production

or inspection—from die sinking machine-tool assembly—which cannot be performed to advantage by properly engineered general overhead illumination, entirely without drop lamps or bracket lamps. The few boring operations and tool room jobs for which a local lamp is desirable are those which require the same supplementary light source even in the brightest daylight. Indeed, the present ideal in plant light is to maintain throughout the shop the seeing conditions which exist directly below a large skylight on a bright day.

One important characteristic of such "sky-light" lighting, natural or artificial, is the low intrinsic brightness (or brightness per unit area) of the light source itself. Except in the rare instances where reflected glare and glare are desirable, such as lighting jewelry store windows, a light source of large area in proportion



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No. 50—1937

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its output has several distinct advantages. Shadows are soft and diffused. With normal mounting arrangements, more light is available on vertical planes. Both direct and reflected glare are reduced to a minimum.

In practice, several alternatives have been adopted to secure a large area light source. Totally indirect lighting is one solution, but it is seldom practical or efficient in the machine shop, as it calls for flat ceilings unbroken by shafting, and kept

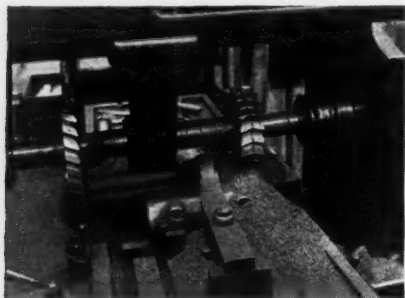


Fig. 5—This machine picture taken at the Monarch Machine Tool Company demonstrates the high detail-revealing quality of mercury light. Even the tiny metal pieces shown are readily seen under this shadow-free light.

immaculately white. Special reflectors of one kind or another with diffusing glass over the lamp bulb are quite common, applied either to incandescent lamps or the newer bulb-type mercury vapor lamps. Their principal limitation is the fact that considerable efficiency is lost in adequate diffusion of the light, particularly where a high light level is desirable and the larger bulbs must be used.

For work on sheet metals, bright metal parts and other applications requiring a minimum of glare at high illumination levels, long-tube mercury vapor lamps of the Cooper Hewitt type have been widely adopted. As this type of light unit is inherently

low in unit brightness, it furnishes practically glareless light without the need for light-absorbing diffusing glass. In the control of shadows and "engineered" distribution of light over machine tools, the 50-in. longitudinal light source permits unusual flexibility, as the lamp may be set up either parallel or perpendicular to the machine, distributing the light evenly along a machine shaft, into recesses in front of and behind a chuck on drill, or as desired.

The Aluminum Company of America uses this method of lighting for inspection of aluminum sheets and bright-finished aluminum alloys. Cooper Hewitt tubes are generally used in the steel industry for tin plate inspection. At the Cheyenne base of the United Air Lines, inspection is regularly made of Alclad sheets of aluminum alloys. Under ordinary incandescent light, the bright aluminum finish is very difficult to work on or inspect. Thus they have adopted the long-tube mercury vapor lighting to obtain a long light source which is both glareless and detail revealing. For fine machine work such as propeller grinding, 50-in. mercury vapor tubes, mounted on 8-ft. centers, are used. A 10-ft. spacing is used in the engine overhaul and assembly shop, and in the sheet metal and welding shops, these lamps are mounted on 12-ft. centers, about 12 ft. high. For general machine work, lighting engineers recommend spacing of these lamps on 10x10, 10x12 or 12x12 foot centers, depending upon the seeing tasks involved.

Recent developments have been made in the Cooper Hewitt lamps which are of note. The new lamps operate in a horizontal position, rather than at the slight angle formerly required for operation. A new principle of starting makes it possible for these lamps to start the instant the current is turned on. Finally, the

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Fig. 6—High bay lighting with the bulb-type mercury lamp affords good general illumination, reducing shadows to a minimum. Note the uniformity of illumination throughout the plant and the bright, sunny atmosphere created by this lighting.

operate at greater efficiency, producing 28 per cent more light per watt than formerly.

One machine operation which requires extremely high standards of precision and, therefore, good seeing, is that of die sinking. At the Ladish Drop Forge Company, Cudahy, Wis., well-known makers of forgings, a "double-decked" arrangement of Cooper Hewitt lamps has recently replaced older lighting units for this task. General illumination is provided by a row of these lamps at a height of 18 ft. In addition, other lamps are mounted directly above each machine on swinging arms, revealing fine details. When die blocks are delivered by the crane, the lamps are easily swung out of the way.

In plants where every effort is made to maintain natural, pleasant surroundings, the "sky-light" unit has sometimes been preferred to the use of straight Cooper Hewitt tubes. This

"sky-light" unit comprises a Cooper Hewitt mercury vapor tube in combination with incandescent lamps above an angular channel of diffusing glass. This method blends the blue-green color characteristics of the mercury vapor light source with the yellow-red characteristics of incandescent lamps. The resultant light source provides a high illumination level with pleasing daylight effect. With the modern trend toward better working conditions for employees, this "synthetic daylight" illumination has been widely adopted.

The Warren Telechron Company at Ashland, Mass., has made use of these new "skylight" units in its recently expanded factory. This company manufactures electric clocks and special devices for synchronizing generating systems and equipment controls, in which work many small parts are assembled. In addition, die making and machining operations require

937

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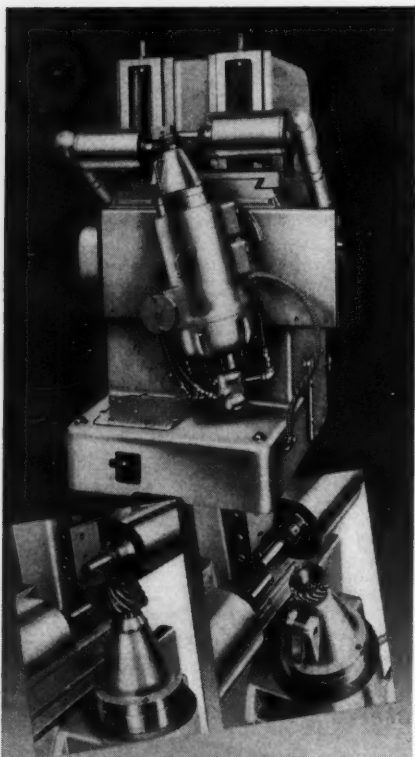
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ing a high degree of skill are integral parts of the manufacturing process.

The units in operation at Ashland are composed of a combination of 33-in. Cooper Hewitt mercury vapor tube with four 150-watt incandescent Mazda lamps. The three important plant operations of die making, co-winding and assembly are all lighted by the new combination units.

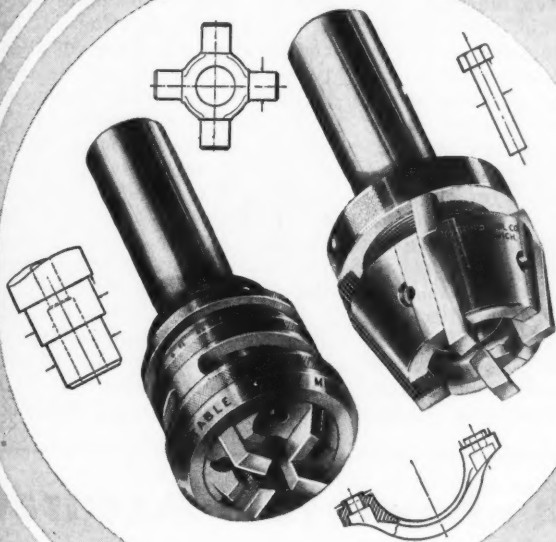
"Skylight" units are used in the machine assembly department of the Gleason Machine Works, Rochester, N. Y. This lighting furnishes uniform, high levels of illumination in the Rochester plant, and the workmen have no difficulty with shadows. Due to the detail-revealing qualities of the light, eye-fatigue is also eliminated.

In foundries or machine shops with high bays, where closely controlled light distribution is not required, the Type H or bulb type mercury vapor lamps are economical and efficient. These high efficiency lamps produce twice the light output per watt of electricity consumed by incandescent lamps.

The Tuthill Pump Company of Chicago has recently built a new plant to take care of increased production demands. In their new long building with high bays, a production schedule of twenty-four hours a day is in effect. At the time of installation of the new lighting system, the Crescent Engineering Company of Chicago recommended that they use the Type H lamps. Use of the bulb type lamps on 12x14 ft. centers, mounted about 15 ft. from the floor, has greatly improved the accuracy of their machine work.

While the bulb type units are normally used for high bays, special diffusion reflectors are now available which make it possible to obtain quality light source combining maximum economy for general machine work. These units are especially

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adapted to lighting of large machine areas, particularly when production schedules require working on a three shift basis, and current economy is an important factor.

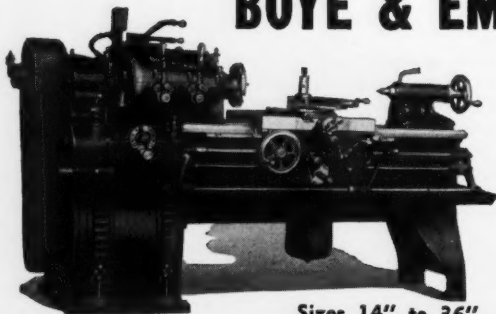
A fine example of the flexibility of mercury vapor lighting is to be found at the Monarch Machine Tool Company, Sidney, Ohio. Above certain of the production machines, straight Cooper Hewitt lamps are used as an aid to high precision work. In addition, bulb type mercury lamps are hung from the ceilings, about 15 ft. above the floor level, providing a high level of uniform lighting throughout the plant. This additional lighting eliminates almost entirely the need for drop lamps formerly used. In the drafting room, combination units are mounted on 10x10 ft. centers at a height of 12 ft. from the floor, furnishing 45 foot-candles of illumination on the drafting boards. All levels of illumination in produc-

tion areas are in excess of 40 foot-candles, and in the newest buildings an average foot-candle intensity of better than 80 is maintained.

Because of the variety and flexibility of light sources now available for machine shop use, high standards of lighting may be obtained within practical cost limitations. It has been conservatively estimated that practically any machine can be adequately lighted for less than 1c per machine hour, including current cost, maintenance and depreciation. Since a machine hour supplies production worth possibly \$3 or \$4, if production be increased only one-half of one per cent, the saving will amount to 1½ or 2c per hour, which is much more than the cost of good quality light.

The many benefits derived from sight-saving lighting conditions make it important to consider all the possibilities of each plant and its specific problems. To install lighting facili-

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ties without taking advantage of the accumulated knowledge and experience of lighting engineers is, therefore, to take an entirely unnecessary chance in gaining the maximum of satisfaction from a new lighting system.

Molybdenum in Cast Iron. This publication is a loose-leaf fabrikoid three-ring binder containing four separate and individual sections devoted to the application of Molybdenum to cast iron, each section comprising a separate publication. Section I, titled "General", defines the term "cast iron" and to a certain extent interprets this definition in terms of the cast iron of older days and the modern cast irons. Charts are included giving the properties obtainable in unalloyed irons, in various sections, made by different processes, also showing the relation of blast pressure and cupola size and presenting the normal melting rate in tons per hour at various cupola diameters. This section closes with a discussion of the effects of various alloying elements and a list of definitions and abbreviations for the various characteristics of cast iron.

Section II is devoted to alloy irons and particularly to the uses of Molyb-

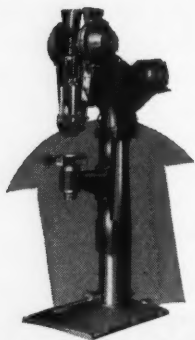
denum in connection with cast iron. In addition to the discussion, photomicrographs are included showing the structures of gray iron without Molybdenum with 1.5 per cent Molybdenum unetched and the same etched. The text includes a discussion of the mass effect in heavy sections and on graphite, also porosity and shrinkage and effect of Molybdenum on physical properties. Photomicrographs illustrating the effect of Molybdenum on graphite in varying sections. A chapter is devoted to the heat treating of Molybdenum Cast Iron, Chrome-Molybdenum Iron and Nickel-Molybdenum Iron.

Section III discusses alloy combinations and presents photomicrographs of plain iron, Molybdenum Iron, Chrome-Molybdenum Iron, Chromium Iron, and Copper-Molybdenum Iron.

Section IV discusses applications and presents information concerning the use of Molybdenum in iron for various purposes such as automobile castings, die, machine tool castings, gears, and so on. A separate section comprising a general index is also included. Copies of this book are available without charge to mechanical executives who will address the Climax Molybdenum Company, 502 Fifth Ave., New York, N. Y., on their firm letterheads.

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Temperature Control in the Hardening and Tempering of Tool Steels

BY W. R. BENNETT

President, Bennett Insured Steel Treating Company, Newark, N. J.

THERE are still a number of old time steel treaters who are nominally successful without employing modern heat calibrating instruments. They are, however, decidedly in the minority. No man, however expert he may be, is able to determine by the eye alone the correct temperature of a hardening oven. In these days when a few degrees of heat more or less are important, heat calibrating instruments are important and no heating oven is complete unless it is equipped with temperature determining instruments.

The temperature indicated by the pyrometer, however, is only the oven temperature. It does not reveal the temperature of the work-piece that is being heated, therefore the operator must exercise his own judgment in determining the proper instant in which to remove the work.

For example: let us assume that we have a hearth-type semi-muffle furnace running at a temperature of 1450 deg. F. We know the instrument is registering correctly. The fire end, however, is located quite some distance from the piece being heated. Only by optical comparison between the color of the fire end and the color of the piece, therefore, are we able to determine the correct moment at which the piece must be removed for quenching.

One might inquire if it is not ad-

visable to allow the piece to "soak" in the oven for a sufficient length of time to admit of a reasonable certainty of its being heated to the same temperature as the oven. There would then be no doubt that the heat in the piece and the pyrometer reading will correspond.

We have learned by experience that neither carbon tool steel nor high speed steel should remain in a furnace and be permitted to "soak" at any predetermined temperature, and also that both should always be quenched on a rising temperature. How then are we justified in "soaking" these particular steels?

There are some steels, particularly HiCarbon-HiChrome, that require a certain amount of "soaking" at temperature in order to compensate for the presumable "lag" due to their chrome and carbon content. There are only a few steels, however, that admit of prolonged heating after the critical point has been reached.

In heating carbon tool steel, and also high speed steel, I have found it good practice to maintain an oven temperature slightly in excess of that recommended for the piece to be hardened.

For example: The piece to be hardened requires a quenching temperature of 1450 deg. F. The oven temperature during the final heating may be slightly in excess of 1450 deg.

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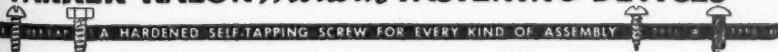
Important is the fact that Stout not only ended the trouble due to bolts and nuts coming loose, but saved considerable assembly time and labor as well.

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F. By optical comparison, one can readily determine the point just below the oven temperature at which the piece should be removed and quenched. Herein is one instance where the human element plays an important part in successful steel hardening. In the light of the above, it is reasonable to state that any heat calibrating instrument reveals only the temperature of the furnace at the point wherein the fire end happens to be located. Consequently, the closer the proximity of the fire end to the work being heated, as is the case with the Interval, the more accurate is the heat determination obtained.

Determining Correct Temperatures by the Aid of a Hardness Tester

Practically every manufacturer of a good tool steel has, by careful research and exhaustive laboratory tests, determined the correct temperatures at which the various brands should be heated prior to quenching. The tool steel manufacturers not only furnish us with this information, but they also tabulate the specific hardness numbers, as revealed by hardness testers, which correspond with these temperatures. We are certain these tests are not made in a "slip shod" manner. Every step has been carefully checked with the sole idea of bringing out the best results in the heat treatment of their output. With this point in mind, we are furnished with the hardness number which a certain temperature should develop.

Assuming that we have several high speed steel pieces to treat in a furnace that is not equipped with a heat calibrating instrument if we note that 2300 deg. F. will develop 64 Rockwell with the 150 Kilo load on the C. scale, we bring the furnace to what we, by previous application, believe is or near 2300 deg. F.

The first piece is then heated, quenched and tested for hardness,

prior to following through with the remaining pieces. If the first piece develops 64 R. C. we may be certain that a continuance of the same heating time and furnace temperature will give a like reading on the remaining pieces.

This statement is not intended to condemn the use of a pyrometer; far from it. It is reasonable to assume that one not equipped with a temperature determining instrument would also be without a hardness tester. However, if both instruments comprise the equipment, the hardness test is a certain check-up on a pyrometer that is operating inaccurately. For forty-eight years the writer has been treating steel and has learned since the introduction of hardness testers, the close relationship they bear to temperatures and calibrating instruments.

Atmospheric Control

Aside from temperature control there is another factor which is pertinent to the successful operation of a hardening furnace oven. The employment of correct temperatures is not a guarantee of satisfactory hardening results. Practically all of the representative manufacturers of heat treating furnaces make it a point to dwell on the fact that their furnaces are equipped with atmospheric control. In the writer's opinion, this should have been accomplished years ago.

The following was taken from the most recent and authentic publication on this subject.

"The knowledge of this subject is at present in a stage of such rapid evolution that it is difficult to express definite conclusion without fear of contradiction. Interest in the possibilities of atmospheric control for the reduction and elimination of scale oxidation has been awakened by a recent flood of discoveries. Several

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years will be required to digest and assort the amount of data recently published on these subjects."

The fundamental requisite for correct atmospheric condition is the exclusion of excess air or oxygen. It is therefore necessary to employ some means to bring about this result.

A furnace so constructed that it does not admit of its being run under proper atmospheric conditions is a liability and should be discarded. If the door opening of either a gas or oil fired furnace is as wide as the hearth or heating floor of the oven, it truly follows that when it is opened for the purpose of inserting or removing pieces, there is an inrush of air and if a number of pieces are being heated, those remaining will be immediately attacked by its oxidizing influence. The last pieces removed will show an increasing amount of scale or oxidization after quenching.

In other words, if the fire is running under perfect atmospheric condition when the door is closed, it cannot and does not maintain the correct condition when it is opened. The fact that there is about 14.7 pounds atmospheric pressure per square inch against any object at sea level is sufficient evidence that nothing will prevent its entrance into the oven.

Inasmuch as this is true, would it not be to our advantage if we were able to obtain and maintain correct atmospheric conditions indefinitely? This can be accomplished in a simple manner. Remove the furnace door entirely or open it to its full extent and block the opening with light semi-insulating brick, leaving an opening only sufficiently large to admit of inserting or removing the work-pieces. Adjust the fire to a non-oxidizing atmosphere by allowing the unconsumed products of combustion — ignited gas—to pass through the opening at a low velocity. This gas will immediately, on its contact, attack and consume

the oxygen of the air and prevent entrance of the oxidizing element.

We must bear in mind that there is as great danger of oxidation from the burner as there is at the door opening, and if we induce an excess amount of air through the burner, the heating chamber will not function properly. While the front opening may be filled to its full area with flame, the oven is far from non-oxidizing. This method permits one to remove the heated pieces at will or admits of moving the pieces on the heating hearth, but does not interfere with the front opening at any time. This particular atmosphere applies to straight carbon tool steel and high speed steel, but does not apply to the correct heating of oil hardening manganese steel.

When one places a small piece of dry wood on the hearth of a furnace and it burns with a noticeable flame, there is certain evidence that the fire is oxidizing. If, on the other hand, the wood does not show this flame but simply takes on the heat of the oven, the fire is to all intents and purposes non-oxidizing. In the first instance there is sufficient oxygen to burn the wood, and in the second, little or none. At any event, the amount of oxygen is insufficient to cause scale on heated steel. An excess of fuel will maintain a "flat" or non-oxidizing fire. An excess of air will develop the opposite.

Tool Steel Containing Hard and Soft Spots

Carbon steels or tool steels are usually purchased in the annealed condition. The manufacturers of such steels have gone to no little expense in instituting equipment for the successful accomplishment of this object.

We, as steel treaters, are little interested in the annealing of bar stock. We are, however, faced with a condition from time to time that develop

trouble. While it is the exception rather than the rule, I believe we have in our experience found pieces of bar stock, supposedly annealed, which were so exceedingly hard in excess spots that no tool was able to cut them. These spots show a much brighter surface after attempted machining than the softer portions, consequently we are justified in the opinion that the steel has not been uniformly annealed.

A piece of steel containing hard and soft spots is primarily un-uniformly hard and soft. If one proceeds with the ordinary method of annealing, consisting of heating the piece and allowing it to cool slowly in lime or ashes, he is rewarded with an indifferent job. This method does not tend to uniformly soften the piece. It does, however, result in relatively softening the soft portion and reduces the primary hardness of the hard spots to such a point that they can be machined.

The objectionable features resulting from the use of this method are: first, the necessary time required; second, the knowledge of possessing an un-uniformly annealed piece with which to commence the job, with the attendant possibility of subsequent difficulties in the ultimate hardening operation.

The first requisite to a uniformly hardened job is a uniformly annealed piece with which to begin operations. We have found that if one removes the scale or oxide and heats the piece to the recognized hardening temperature and then quenches it in water or brine, it will be uniformly hard. Inasmuch as we then have a piece of even hardness, it is only necessary to re-heat to a lower temperature than that used for the quench to be rewarded with a uniformly soft piece which will machine readily. In this connection it might be well to state that it is entirely unnecessary to heat

a previously hardened piece of tool steel to a point within 150 degrees Fahr. of that required for hardening in order to anneal it.

Large tools made from any hardened steel should never be abruptly placed in a hot fire for annealing. It is always advisable to pre-heat slowly, in order to lessen the chance of sudden expansion and subsequent bursting. It is also good practice to materially reduce the temperature of a drawing or tempering medium prior to decreasing the hardness of tools of this nature.

The Long Draw

Unquestionably, retarded cooling after a piece has been hardened and drawn will add to its toughness without materially decreasing its hardness. If commercial steel treaters religiously followed the specifications appearing on some orders pertinent to the long drawback required, it would necessitate the employment of numerous heating units for a long period of time, increase the cost, and slow down production. For those not concerned with these objections, this method may apply. However, I am of the opinion there is a method which will attain equal or better results at much less cost than by a long drawback. Let us call it the "slow cool down".

Where specifications call for a 400 deg. F. drawback for a period of five hours on a die already hardened, we may employ an electric furnace or an oil bath for the operation. The furnace containing the die is gradually brought to the required heat and the temperature maintained for a period of five hours. The piece being heated has undoubtedly reached a thoroughly saturated heat equivalent to furnace or bath temperature long before the time specified. It is, however, allowed to remain its full time and either

quenched or permitted to cool in air at room temperature.

If the piece is quickly quenched after the "long draw", we are, in a great measure, defeating the purpose. If we allow it to cool in air it is quite materially benefited.

It has been my experience that the "long draw" when accompanied by either of the described cooling steps does not develop such results, particularly as related to toughness, as does the "slow cool down" after drawing. Neither do I believe it necessary to prolong the drawing time after saturation has been reached. A much longer period for cooling than either the quick quench or air cooling should be employed.

We are all aware that insulation, when correctly applied, will maintain heat or cold over an extended period of time. It is the slow cooling that develops toughness, and in order to accomplish this it is only necessary to

place the piece, after its removal from the drawing furnace, in a box and pack well with ground asbestos or any other suitable insulating material. This applies to any steel. A piece weighing five pounds subjected to this treatment will be warm to the touch after about twelve hours. Results: no furnace holdups, no added cost and a tougher tool.

Cause and Prevention of Soft Exterior Experienced With Treated Oil Hardening Manganese Steels

The following, taken from a descriptive pamphlet of instructions issued by one of the oldest established steel concerns in the East, comments: "All oil hardening steels seem more prone to surface decarbonization than water hardening steels. This is important, because it probably has a great deal to do with explaining otherwise mysterious inequalities in production. There is no specific for it

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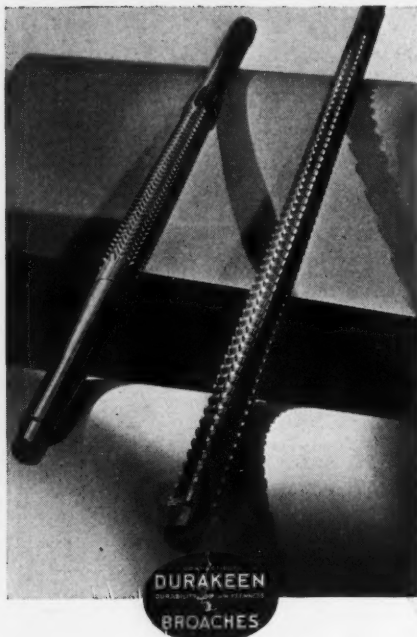


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prevention, unless the piece can ground all over after hardening. Control is a problem for particular tools in particular plants."

Attention is brought to the above quotation because some of us are inclined to take the other fellow's conclusions as gospel and do not make the effort to analyze for ourselves. Surely the straight manganese hardening steels show a very marked tendency to soft exteriors although hardening temperatures and time of heating may, in each case, have been correct.

It is safe to say that, as a result of this occurrence, steel is often condemned because of this condition when, as a matter of fact, it is blameless and the fault lies solely and only with the operator himself.

It is an easy matter to attribute this condition to "decarbonization." "Decarb", however, is not the answer. It might be well for us to consider its exact opposite. This condition is the result of faulty oven atmosphere and nothing else. A highly reducing atmosphere tends toward a carburizing surface, thus throwing out of balance the carbon and manganese; the result is a slightly Austenitized surface which will be soft to the file.

A fire running close to the dividing line, possibly on the "lean" or oxidizing side, will develop a Martensitic structure the hardest known microconstituent. The piece after quenching will show no evidence of soft exterior.

Hi-Carbon: Hi-Chrome

Practically all of the manufacturers of this steel do, somewhere in their instructions for its treatment, recommend pack hardening. From the viewpoint they may be justified inasmuch as they are aware that pack hardening does, to an appreciable extent, eliminate soft exteriors.

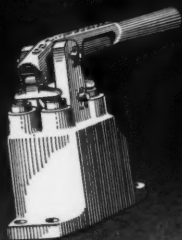
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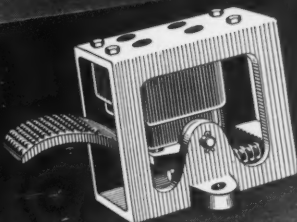
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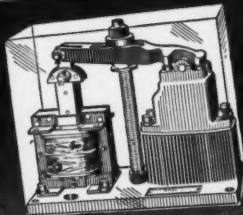
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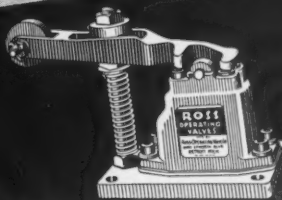
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aware that soft exteriors are a result of incorrect furnace atmosphere. They also know that this particular steel is more susceptible to this condition than other steels. By no stretch of imagination could they succeed in bringing about much needed results with a few written suggestions, consequently they advise the lesser evil—"pack hardening."

Why evil? Without entering into a discussion of chemical change or reaction which may be the result of pack hardening, we must admit our chief object is to obtain surface hardness. It is reasonable to assume that steel carrying such a high carbon content would not take on added carbon during the heating period, irrespective of what the packing medium might be.

We do know, however, that pack hardened Hi-Carbon: Hi-Chrome steel is more inclined to surface cracks as a result of grinding. We also know that if we are, by careful grinding, able to reduce or take off the first ten thousandths without developing checks, we can then, at necessary intervals, continue the grinding process with little or no danger of subsequent checking.

It is general practice to oil quench these steels from the pack. The possibility of distortion or cracking in the quench is not lessened by pack hardening.

Hi-Carbon: Hi-Chrome steel heated in a properly constructed furnace running under correct atmospheric condition is also oil quenched as a general rule. The possibility of distortion or cracking is still a factor, even though the piece may be uniformly hard.

Nearly all of this steel is air hardened. If we heat as described above and with no oil quench, allowing it to cool in still air, we find, after the piece has cooled to room temperature, a soft exterior with an exceedingly

hard sub-surface. No doubt this soft surface is caused by the attack of oxygen during the cooling process.

By all manner of reasoning one would assume this method to be the safest to adopt if we could only eliminate the soft surface, inasmuch as the possibility of cracking or distortion is negligible.

The answer reverts to the exclusion of the attack of oxygen during the cooling period. If the piece is removed from the furnace and quickly submerged in a molten cyanide bath immediately withdrawn and allowed to air cool, there will be no attack of oxygen. The salts will hermetically seal the piece to the exclusion of air. When cold it may be placed in warm water and the salts dissolved. The piece will be uniformly hard, free from surface defects, with no cracks and no distortion.

(A booklet on the heat treating of tool steels, which all of the above information is included, may be sent free upon request to Bennett Insured Heat Treating Co., 130-132 South St., Newark, N. J.)

"Some Consequences of Graphitic Corrosion of Cast Iron." Investigation shows that the rapidity with which graphitic corrosion of cast iron sometimes occurs may be due to local galvanic effects between the porous galvanic coatings and the underlying metal. The development of protective coatings is influenced by the size and distribution of the graphitic particles. Nickel alloy cast iron have favorable characteristics in this respect which probably account for their better performance in many corrosive environments.

"Some Consequences of Graphitic Corrosion of Cast Iron" is the title of a recent publication dealing with the mechanism of a type of corrosion of cast iron that results in the formation of a surface layer of residual graphite. This publication is now being distributed by The International Nickel Company, Inc., 67 Wall St., New York, N. Y., and copies are available gratis to engineers and plant executives.

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Modern Equipment at Work

Arc Welding In The Arctic

By P. A. ROBBINS

Arctic Circle Exploration, Inc., Chicago, Ill.

FAR north, on the bare Arctic tundra, eleven miles above the mouth of the Keewalik River where the latter discharges into Kotzebue Sound, several Eskimos garbed in parkies and muckluks mingle with a small group of similarly clad white men. All of them shield their eyes from the white glare of the arc as a gasoline driven arc welding set rains molecules of metal on the break in a "bull-wheel," the large gear-wheel which swings the boom and cab of a dragline shovel.

And where is Kotzebue Sound? Follow the coast of Alaska out to the end of the Aleutian Peninsula, round the point and bear north across the Bering Sea, cross Bering Strait—that narrow strip of water that separates America from Asia—and continue up the coast 200 miles, following the Arc-

tic Circle, and you are on the shores of Kotzebue Sound.

It was a tragic moment for a little group of miners working in the vicinity of a hamlet called Kiana, north east of Kotzebue Sound, when the heavy gear-wheel of their dragline broke. Tragic because they had risked their money to bring the dragline into a country where mining can only be carried on for about 100 days a year, from late June to early September. The rest of the year finds the country locked in the icy grip of winter, its rivers frozen solid to their beds and the tundra a desert of snow-drifts.

There was only one chance to save the season's work. To the southwest of them, down the Kobuk River, across Kotzebue Sound, and up the Keewalik River they knew that Arctic Circle Exploration, Inc., had a well-equipped mining outfit at work at a little settlement called Candle. In-



The welder is mounted on skids so that it can be hauled across country by tractor.

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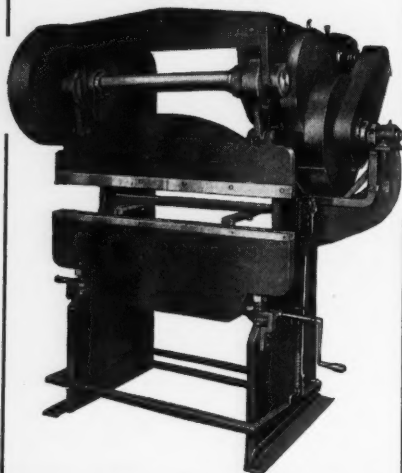
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cluded in the equipment at Candle was a General Electric gasoline-driven arc-welding set.

The broken bull-wheel was loaded in a "umiak", a native boat made of skins, and for five days an Eskimo crew paddled down the Kobuk, around the shore of the sound, and up the Keewalik River to the settlement of Candle. Here, within three hours of their arrival, the pieces of the broken bull-wheel were assembled and welded into place. Instead of the ruinous loss of a season's work, the interruption lasted only two weeks.

The files of Arctic Circle Exploration, Inc., are filled with similar stories of loss avoided by means of arc welding. A stripped pinion on a dredge threatened to be the cause of a serious loss of time. An airplane was summoned by radio and a messenger dispatched to Nome to search through mining stores and scrap piles for a substitute gear but before he returned, unsuccessful, the old gear had had a new set of teeth built up from welding rod and had been returned to service with the loss of only one day.

Miles of pipe line stretch across the tundra, pipe from 15 to 30 inches in diameter, and when Ys, or Ls, or Ts, or bends are needed, they are fabricated on the job, made up from bits of pipe welded together in the desired form.

Thousands of three-quarter inch thawing pipes are in use, each length of pipe having a special steel point welded to it. When the points need to be replaced, because of breakage and wear, the job is quickly done with the welding machine.

Worn machinery parts are built up with welded metal, as are parts reclaimed from the scrap heap. Innumerable odd jobs, each important though small, are executed successfully through the short, intensive working season. Dredges, tractors,

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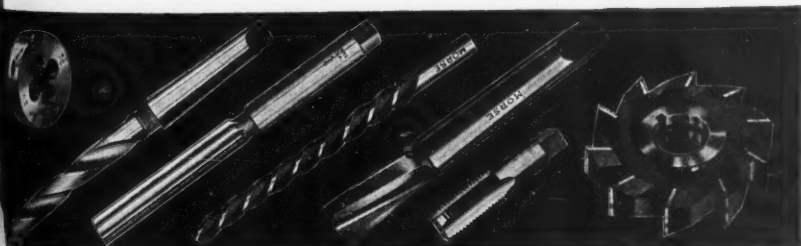
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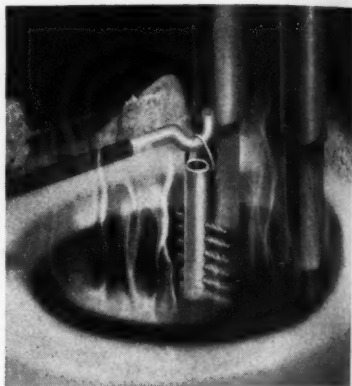
draglines, and scrapers must be kept at work every hour possible. The gold to pay the costs must be wrested from the frozen gravels of the valley so delays can not be countenanced.

The gasoline-driven arc welding set at Candle is always on the job, ready to serve. It is not permanently installed in the shop, but instead is mounted on skids so that it can be dragged across country by tractor to the place where its service is required.

Heat Treatment of Cutting Tools Ensures Quality

IN order to ensure the production of cutting tools of the highest quality, the Putnam Tool Company, 2981 Charlevoix Ave., Detroit, Michigan, is now using the salt-bath process in the heat treating of the entire line which comprises their product. This method calls for the submersion of the tools in four successive salt

baths, in which uniform temperatures are constantly maintained by the use of special electrical controls. The



Submerging Putnam tool in salt bath for heat treatment.

tempering is done in a Homo electric furnace, after which the tools are



What is the "FACE VALUE" of a Dial Indicator?

The "face value" of a Dial Indicator is its ability to give accurate readings at all times—even after continual rough treatment.

The Standard Dial Indicator has a high "face value." Its new Shockproof construction protects delicate mechanism from shocks that would destroy the precision of the average Dial Indicator.

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For Better Gaging—Come to "Standard"

STANDARD GAGE CO., INC.
POUGHKEEPSIE • NEW YORK



“Specs” in the vernacular may mean either specifications or spectacles.

Wouldn't it be fine if we could give you “Specs” for your nose that would enable you to observe if the heat treatment “Specs” on your blue prints had been observed in the hardening operations. We almost can.

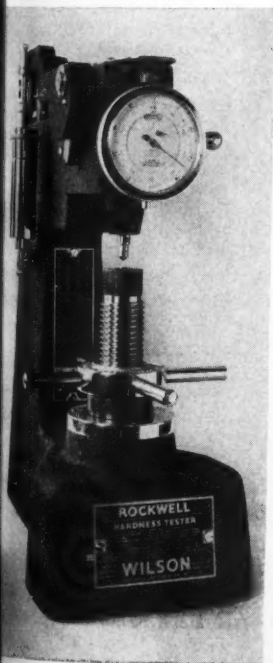
Just slip a “ROCKWELL” with its direct reading dial, between your eyes and your specimens and you will see true hardness and know what you've got. Use the “ROCKWELL” as your “Specs” for “Specs”.

WILSON

MECHANICAL INSTRUMENT CO. INC.

Concord Ave. & E. 143rd St.

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finished by shot blasting.

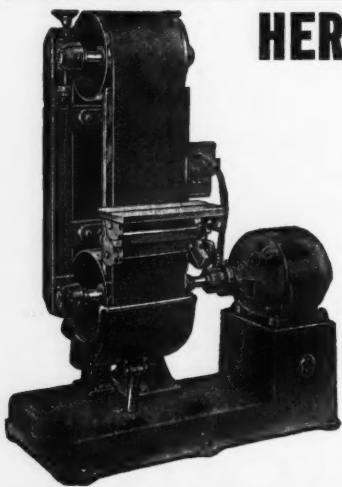
In this process two salt baths are used for preheating at temperatures of between 1500 and 1600 deg. The third bath is for "high" heating at from 2300 deg. F. to 2350 deg. F. The fourth, or quenching bath, is held between 1100 and 1200 deg. F. After submersion in the quenching bath, the tools are allowed to cool in still air and then are arranged in wire baskets and placed in the Homo electric furnace, where they are tempered in a temperature between 1025 and 1075 deg. F. After removing from the tempering furnace, they are blasted, in a special blasting chamber, with minute particles of steel shot.

Due to the fact that the tools are completely submerged in the solution and are heated in a perfectly neutral atmosphere, there is no possibility of oxidation or scaling. No decarburization occurs. The possibility of distortion is precluded by the fact that every portion of each tool reaches the

same temperature at exactly the same time.

Landis Catalog K-137 is a 24-page book describing and illustrating the Landis 12x28-in. Universal and Tool Grinder, manufactured by the Landis Tool Company, Waynesboro, Pa. A complete description of the grinder, wheel head, headstock, traverse drive, and so on, is presented, together with photographs of the various parts. One section is devoted to typical operations which can be performed on the grinder with standard equipment, including descriptions of the universal head, left-hand footstock, universal tooth rest, and center rest.

Another section lists the operations which can be performed with optional and additional equipment — the wheel grinding attachment, internal grinding attachment, single speed headstock, hob grinding attachment, adjustable vice, circular forming tool grinding equipment, gear cutter grinding attachment, radial grinding attachment, face mill grinding attachment, end mill grinding attachment, surface grinding attachment, magnetic chuck, and the magnetic plate. Specifications of attachments and a listing of standard equipment are included. Copy free upon request.



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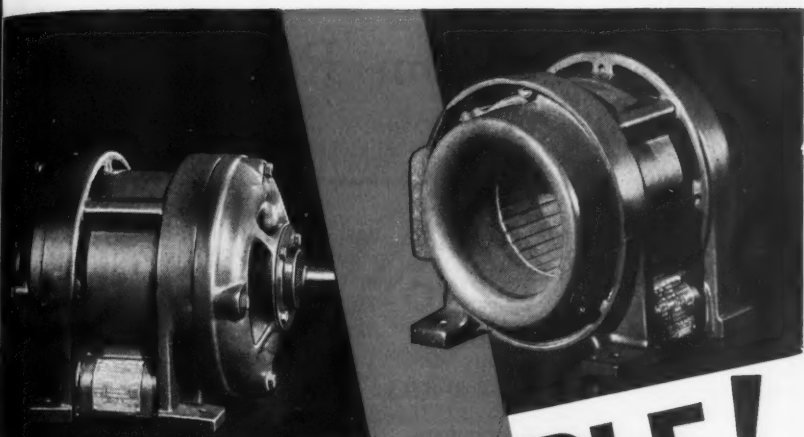
You can give a high quality, straight line finish to metal, rubber, fibre composition wood, etc. with a Peerless Surfacer. Since all points on the abrasive belt travel at the same speed, the cutting action is more rapid and more uniform.

With a Peerless Surfacer you eliminate the time and expense of gluing and drying grinding wheels and discs.

Vertical or horizontal machines available in 4" to 20" sizes.

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GREENFIELD, MASS.



IMPREGNABLE!

In the Allis-Chalmers Seal-Clad Motor the wound stator receives impregnating treatment, similar to the conventional type of winding. Then a Moulded Shield of high dielectric and mechanical strength is fitted into a machined slot in the stator frame and tightly sealed into position with a special compound—thus giving complete protection to the coils.

This feature makes Allis-Chalmers Seal-Clad Motors impregnable to metallic dust, grit, oil, moisture, chemicals and other agents destructive to motor windings.

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If your plant conditions are severe, the ultimate in motor protection is essential to you—Allis-Chalmers Seal-Clad Motors offer the ultimate in motor protection. If your plant conditions are not so severe as to make this protection absolutely essential, Allis-Chalmers Seal-Clad Motors are still the soundest investment you can make, **BECAUSE YOU ARE GIVEN THIS GREAT ADDITIONAL PROTECTION AT NO ADDITIONAL COST.**

For further details, write today for Leaflet No. 2182.

The Allis-Chalmers Mfg. Co. builds standard motors of every type from 1 h.p. up—also motors for special application.

MOTOR DIVISION

ALLIS-CHALMERS



MILWAUKEE WISCONSIN

Ideas from Readers

This department is a clearing house for ideas . . . If there is a "kink" or short cut in use in your shop, send in a description of it . . . Each one published will be paid for.

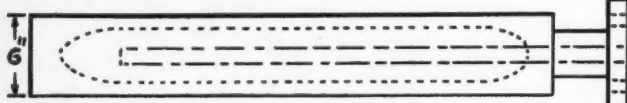
Solving a Difficult Boring Job With a Vacuum Cleaner

By CHARLES C. LYNDE

THE oil field machine shop probably is confronted by more unusual work demands than any other type of jobbing shop, due to the great number of various kinds of equipment in use in the drilling, production and

dash-and-dot line) entailing the removal of approximately 80 pounds of metal through the "bottle-neck" of $7\frac{1}{2}$ in. of $1\frac{3}{4}$ -in. hole through the flange and neck of the plunger.

Due to the relatively small hole through which work must be done, and the fact that 305 cubic inches of iron had to be removed, the problem of chip removal slowed down the work



Drawing indicating amount of stock to be removed from interior of a pipe-line pump plunger.

pipeline departments of the petroleum industry. An example of the kind of work that keeps the days—and nights—from becoming monotonous is the plunger from a 6x24-in. pipeline pump which came in to be worked over.

As originally cast in the foundry of the pump maker, the cast iron plunger had a cored recess extending axially from the flange to about 7 inches from the pressure end. This cored hole, $1\frac{3}{4}$ -in. in diameter, was not for the purpose of lightening the plunger, but to relieve shrinkage strains and prevent the formation of cracks or spongy metal.

The plungers, 18 of them in all, weighed originally an average of 286 pounds apiece. They were 6 inches in diameter at the working barrel, and $44\frac{1}{2}$ -in. in length. The work to be done was that of enlarging the original cored hole to approximate that shown by the lightly dotted line in the drawing (original hole shown by

more than any other one factor. Since the boring bar practically filled the "bottle-neck," there was no chance for the

chips to work out along it during progress of the boring. Blowing out the chips with compressed air cleared the hole, but was unsatisfactory in that it sent a shower of fine dust all over the shop to the detriment of other work being done, while dismounting the plunger and allowing the chips to gravitate out entailed much unnecessary set-up work.

Finally an old vacuum cleaner of the common household type was secured and set up alongside the boring job. Then, each time a cut was finished and the bar withdrawn from the plunger, it was easy to start the cleaner, thrust the hose into the aperture at the flange, and quickly suck out through the hose all chips and dust.

So accurately was the work done to leave the specified wall thickness of one inch in the finished plungers that, although the incoming weight of plungers varied by as much as ten



Only an Unbreakable

*Alloy Steel Back
can assure full life from a
High Speed Steel Edge*

Because it is *hard* and *wear-resisting*, genuine High Speed Steel makes the finest cutting edge—fastest cutting, longest lived. But because it is hard, high speed steel is relatively brittle—though best for the teeth, it is ill suited as a backing for the teeth, since the backing must be non-brittle to withstand the strains and shocks of tensioning, reversing, and feed load, without breaking. Only MARVEL High-Speed-Edge offers the “perfect ideal,”—the only hack saw blade with genuine high speed steel tooth edge integrally welded to a tough, non-brittle, non-breakable, chrome-vanadium steel back or body. Only by standardizing on MARVEL can you be sure to get full life and genuine high speed efficiency.

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High-Speed Edge

HACK SAW BLADES

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pounds, the weight of the finished work checked to within half a pound and all checked for concentricity of bore when balanced on parallel knife edges.

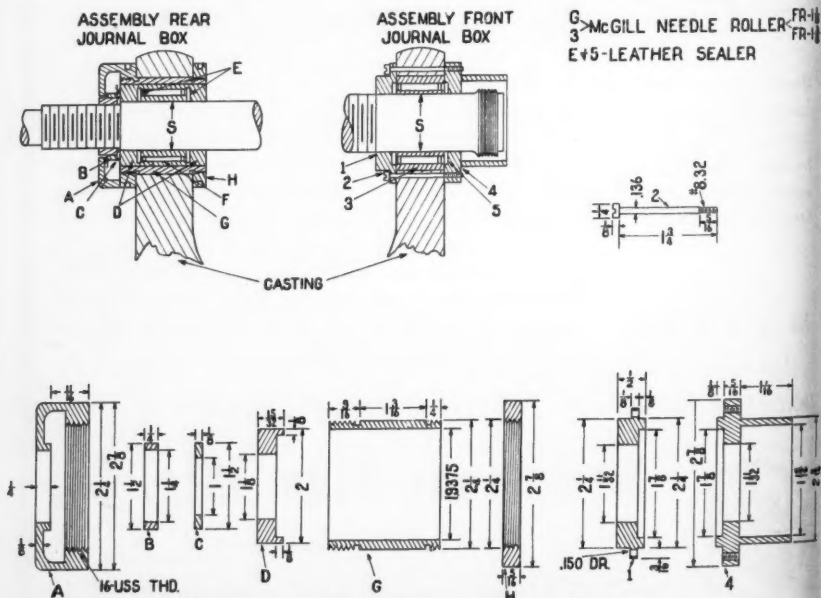
Simplified Design of High Speed Spindle for Brown & Sharpe Automatic Screw Machines

BY WALTER G. PORTER

THE present-day trend toward higher cycling speeds in automatic machine operation often proves a handicap to the small jobber, as he finds it difficult to compete on large quantity jobs when the only machines available are standard-type automatic machines. However, this limitation on speed is imposed only by the plain-journalled spindles, and in view of this fact, the writer designed the spindle illustrated here.

The standard spindle and machine casting were used, together with the parts shown in the drawing. A vertical boring mill was used to bore out the cradle of the machine to take the roller bearings. With this improvement, the machine-spindle has been run at speeds in excess of 6,000 r.p.m. without dangerously overheating the bearings.

The assembly consists of the following parts: (A) Thrust adjustment collar. Material, cold rolled steel, pack hardened to 50 C Rockwell. (B) and (C) These parts are the same as used in the standard assembly and need not be replaced unless they show excess wear. (D) Locating bushings, used to hold roller bearing outer race in a neutral position. These parts are turned to a tight press fit in the part marked G. Material is phosphor bronze. (E) and (5) This part is leather (old belting is ideal)



Drawing of roller bearing spindle and parts to increase speed of Brown & Sharpe automatic screw machine

VAN-LOM

T.M. REG. U.S. PAT. OFF.

AN *Improved* M O L Y B D E N U M H I G H S P E E D S T E E L

ON SOME JOBS IT GIVES MIGHTY FINE PERFORMANCE

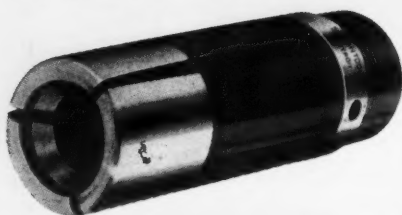
Actual production results and heat treating uniformity stamp VAN-LOM the first major improvement in Molybdenum High Speed Steel. 25% to 40% Better Cutting Properties.

A new booklet telling how VAN-LOM came into existence and also how to heat treat it, is available for the asking. Write for it on your letterhead.

VANADIUM-ALLOYS
STEEL COMPANY
LATROBE, PENNSYLVANIA



SUTTON MASTER FEED FINGERS



**Interchangeable and Replaceable
Pads of Hardened Steel,
Iron or Bronze**



Double angle on sides of pads permit worn pads to be brought back to gripping size by grinding down angles and allowing tension of master to bring pads closer together



Spreaders furnished with fingers permit pads to be changed quickly and easily. No pins or screws to hold pads in master

**For Long Wear and Protec-
tion of Stock, Specify Sutton
Only**

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SUTTON TOOL COMPANY
2838 W. Grand Blvd., Detroit, Mich.

cut to fit into the counterbores in parts (D), (1) and (4). The hole is cut slightly small so that it will hug the spindle bearing surface tightly and thus prevent chips or dirt from entering the roller race assembly. (F) McGill Precision Type Needle Roller Bearing No. FR 1½ in. (G) Roller race retainer bushing. Material, cast iron or brass. (H) Thrust adjustment collar, threaded internally to fit part G. Material, cold rolled steel. Pack hardened to 50-55 Rockwell C. (1) Front journal rear race retaining collar. Material, cold rolled steel. (2) Two special No. 8-32 thd. screws, as shown. Material, cold rolled steel. (3) McGill Precision Type Needle Roller Bearing No. Fr. 1½ in. (4) Front journal front of race retaining collar. Material, cold rolled steel.

The dimension (S) is the nominal diameter of the spindle bearing. In the case under discussion, this dimension was 1½ in. at the rear and 1 in. at the front. However, if the machine has been run for any length of time, it will be necessary to have these two journals chrome plated oversize and reground on centers to a tap fit in their respective roller bearing inner races.

The two screws which hold parts (1) and (4) against the cradle should be drilled through the two collar flanges and the cast iron cap, but due to the spindle pulleys, assembly is impossible if other screw holes are drilled through the main casting.

The spindle is assembled in the same manner as a standard spindle. The entire spindle, bearings and all, can be removed from the cradle by merely removing the caps from the front and rear journals. If all the parts which need to be made over on account of the roller bearings are made exactly according to the drawing, no matching or fitting other than the usual amount of hand adjustment will be necessary.

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5 MEN DO THE WORK OF 6

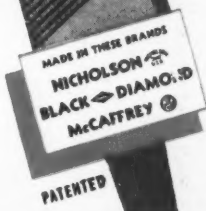


Tests show that on the average five men can do the work of six . . . not once in a while but every time, if they use Nicholson, Black Diamond or McCaffrey Files.

For the most exacting file tests ever devised show that these files are uniformly high in their ability to remove stock . . . that the performance of one represents faithfully the performance of thousands of dozens.

Now . . . while skilled labor shortage makes it necessary sometimes for five men to do the work of six, use the files that will help them do it *every time*. Nicholson, Black Diamond or McCaffrey . . . fastest cutting . . . uniformly high in performance. At Mill Supply Dealers'. Nicholson File Company, Providence, R. I., U. S. A.

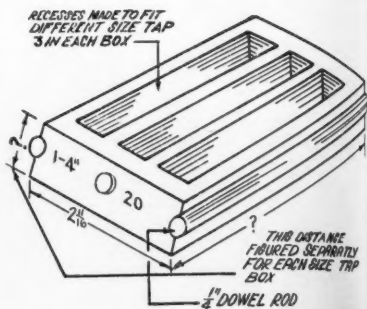
A FILE FOR EVERY PURPOSE



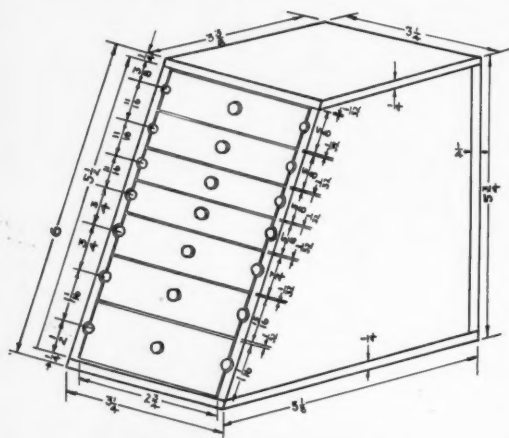
Tap Cabinet

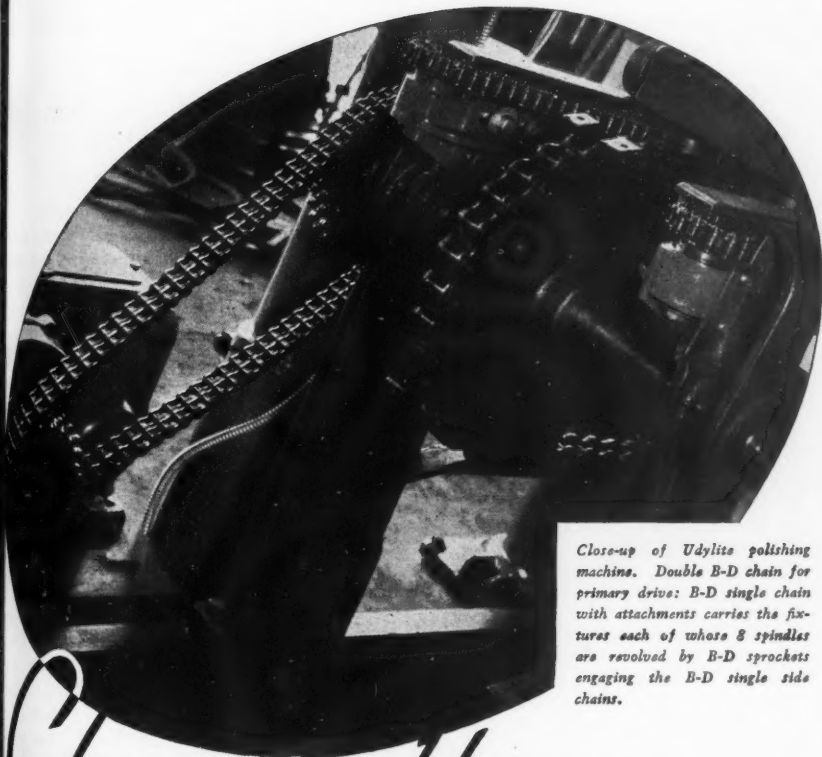
By C. F. Fritz

TAPS are often purchased in sets and an attempt is made to keep the sets together, but in many cases this becomes a problem. The boxes in which the taps are shipped from the factory are usually of cardboard which break easily or soon become oil-soaked and fall apart, with the result that the taps either are lost or roll around in the box. In the latter case they strike against each other and dull the cutting edges. To overcome these difficulties, the cabinet illustrated in the drawings was made.



Each drawer is a solid block of wood, recessed to take taps of the size desired.





Close-up of Udylite polishing machine. Double B-D chain for primary drive: B-D single chain with attachments carries the fixtures each of whose 8 spindles are revolved by B-D sprockets engaging the B-D single side chains.

Cleaning Up WITH **BALDWIN-DUCKWORTH**

Suppose you had to clean and polish 16,000 lamp sockets, door knobs or other similar items an hour? This new Udylite polishing machine could do it for you economically, in part because of the generous use of 3 different types and sizes of Baldwin-Duckworth roller chain; and over 100 Baldwin-Duckworth accurate-cut sprockets.

When you want to "clean up" on production costs, there's a good chance the best answer is the right Baldwin-Duckworth roller chain. Consult our engineering department for a detailed analysis of your particular job. Baldwin-Duckworth Chain Corporation, Springfield, Mass.



ideas. The knobs are of brass, fastened with flat head wood screws.

The entire cabinet was given a heavy coat of black shellac to prevent it from becoming oil-soaked. The sizes of the taps in the various drawers may be painted on with white paint, or stamped in metal tags which may be attached with screws or brads. The cabinet has not only saved many taps that would otherwise become lost or damaged, but has also saved a considerable amount of time that was

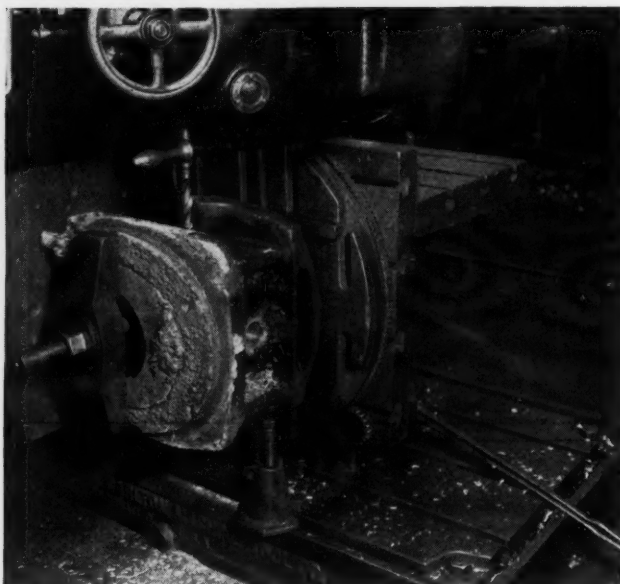
previously lost in searching for the right size taps.

Geared Fixture for Radial Drill

By G. F. CAGLE

WHEN an old machine is scrapped, it is sometimes possible to salvage portions of it for use as accessories to other machines. For instance, the geared fixture shown in

use in the illustration was made from an old boring mill table. Used in connection with a vertical surface plate it forms an admirable piece of equipment for radial drill work. The old table not only has all the necessary T-slots for clamping work, but it also has teeth cut around the periphery by which,

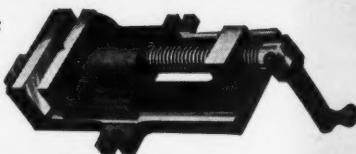


Geared fixture made from old boring mill table aids in handling work on radial drill.

ELIMINATE SPECIAL AND COSTLY JIG FIXTURES

By Using Yost Drill Press Vises

They are heavily constructed and very compact. Three flanges on the base permit easy attachment to machine or drill press table. A "V" shaped slot milled in the movable jaw permits a positive locking of vertical work. The ease and simplicity in operating makes this tool an indispensable factor in the execution of drill press operations.



Write us for circular "H", giving us name of your nearest dealer.

YOST MANUFACTURING COMPANY, MEADVILLE, PA.

November
"9000-
Metal S
made
Single M

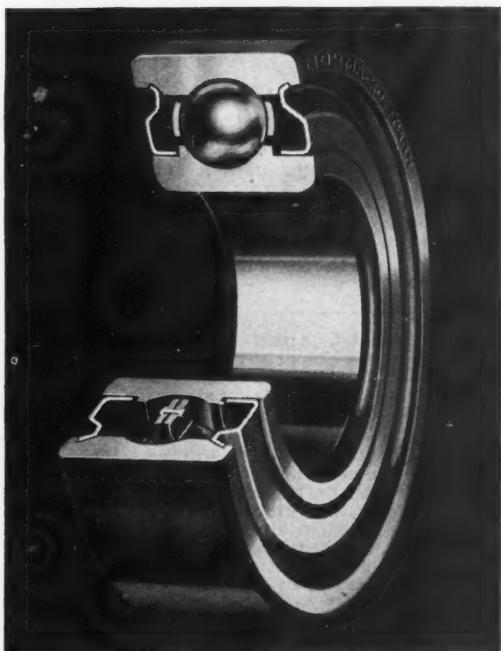
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NORMA

"9000-DD", with Double Metal Seals, here shown; also made as "9000-D" with Single Metal Shield.

LARGER GREASE CAPACITY • NO SEAL DRAG



IN "9000" SERIES (Feltless)

SELF-SEALED BEARINGS

Interchangeable in dimensions with felt seal bearings.

Employs simplified, inwardly extending, flanged metal shields which do not rotate and cannot "foul" other rotating seal parts.

Seals are highly efficient in retaining grease in either horizontal or vertical position.

Simple seal occupies less space within bearing than felt seal, PROVIDING GREATER GREASE

CAPACITY AND A MORE LASTING LUBRICANT SUPPLY.

Metal seals, though close fitting, clear recess on inner ring, ELIMINATING "DRAG" OR FRICTIONAL RESISTANCE and power loss, and providing higher starting speeds and increased efficiency. Seals cannot wear and are permanently effective.

Totally sealed against foreign matter, providing absolute cleanliness at all times.

"NORMA-HOFFMANN"

PRECISION BEARINGS

BALL, ROLLER AND THRUST

NORMA-HOFFMANN BEARINGS CORP'N., STAMFORD, CONN., U. S. A.

with the aid of a pinion, the table can be adjusted to locate the work at any angle desired.

In the case illustrated, the driving box has been set up to have holes drilled in it to aid in the welding-in of liners. The operator uses a small square as an aid in setting the table accurately. The end of the pinion shaft has been squared to fit a ratchet wrench with which the pinion is revolved.

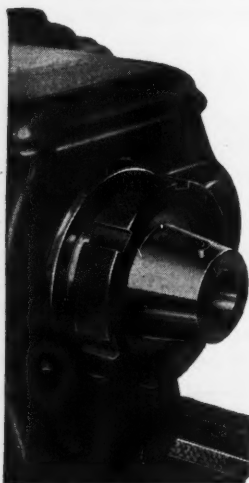
Chronolog Booklet. A new booklet describing three new models of Chronologs, production control instruments, has been published by The National Acme Company, 124 East 131 Street, Cleveland, Ohio.

This booklet gives complete information on the use and operation of the Chronolog, claimed by the manufacturer to be the only instrument that keeps a running record of time and a count of pieces on the job—and prints this information on a chart that may be read as easily as a typewritten report.

A new line of super-sensitive line voltage switches and Namco Solenoids are described in the same booklet. Copies may be obtained on request.

Norton Grinding Wheel Markings are fully explained in a folder being distributed by Norton Company, Worcester, Mass., to aid the user in purchasing grinding wheels. A typical marking 3846-J5B, is broken down to show the reader the meaning of the various parts of the marking. This booklet should be useful to all users of grinding wheels, and a copy may be obtained by addressing the Norton Company as above.

"Build Your Own" Hobart Welding Generator. This folder, issued by Hobart Brothers Company, Troy, Ohio, gives details on the Hobart plan for building portable welders. The Hobart "Build Your Own" Unit consists of a welding generator, exciter, reactance, control terminals and flexible coupling built into a single, compact unit which can be connected with a gasoline engine or motor. Features of the Hobart Arc Welder are presented, together with photographs of welding outfits in use in various parts of the country. Copy free upon request.



SIDNEY TAPERED SPINDLE NOSE

SIDNEY has now adapted the standard tapered spindle nose as optional equipment on the Tritrol 16-speed, Sidney 12-speed and SIDNEY Precision Tool Room Lathes.

Advantages: More power — greater ease in removing face plates and chucks—brings face plate and chuck closer to the front spindle bearing.

Write for further information.

"Lathes and Milling Machines"

THE SIDNEY MACHINE TOOL CO.
210 HIGHLAND AVENUE • SIDNEY, OHIO

YOUR LIGHTING DOLLAR BUYS MORE WITH...

these new
HORIZONTAL
COOPER HEWITT
Lamps

More light is yours from these modern light sources. They start instantly and hang horizontally to give the best light distribution. You save, in addition, because you can run more lamps per circuit. The improved appearance has added to the immediate acceptance by industry of this improved lamp.

Even in the most difficult places you are assured an ease of seeing that profits both the worker and the manufacturer. These new "24-hour skylights" produce a soft, non-fatiguing light that reveals detail . . . promotes better work . . . and reduces errors. There's a representative nearby who will be glad to give you complete information. He will gladly survey your needs and tell you what modern Cooper Hewitt lighting can do for you. If you order, write directly to the General Electric Vapor Lamp Company, 897 Adams Street, Hoboken, New Jersey.



There is no glare from polished metal surfaces . . . scratches are easily detected . . . eyes are rested . . . and better work is more easily accomplished with the "better than daylight" illumination of the new horizontal Cooper Hewitts.

GENERAL  ELECTRIC
VAPOR LAMP COMPANY

Over the Editor's Desk

IN AN address before the Thirty-sixth Annual Convention of the National Machine Builders' Association, last month, Clayton R. Burt, President of the association, made a few remarks which could very well be passed on to other manufacturers. Following are some excerpts from Mr. Burt's talk:

"We are**disturbed by the current recession of business, which is occurring in spite of the well-known shortage of housing, foodstuffs, materials, and equipment. To replenish these needs should keep all of our industries running at full capacity. In machine tools alone, we know that our customers have scarcely begun to replace the old equipment that is no longer giving efficient service. No one can blame executives or managers for the cautious policy that they find it necessary to adopt, but we regret that the aggregate of production in many lines is less than is actually needed to supply the wants of the whole people at prices they are able to pay.

"As one example of misdirection on the part of the government, due to a lack of comprehensive understanding of industry's financial problems, I cite the Tax on Undistributed Surplus laid upon corporations by the 1936 Revenue Act. ***This particular legislation will, if continued, defeat the aims of the administration in several directions, not the least among them the stabilization of production and employment, which is so vital to prosperity.

"Those who were responsible for this law were not fully informed of the importance of corporation reserves to the country during the bad years of 1930 to 1934. During these years, while the government spent eight billions of dollars in an effort to restore a normal balance, corporations spent over eighteen billions of dollars more than they received. To do this they not only had to have a surplus on

hand, but that surplus had to be readily available in cash or quick assets; not tied up in buildings nor frozen in finished goods for which there was no market.

"Any conservative executive considers it his first duty to restore his depleted cash reserves when business returns, in order that his company may be prepared to face the next emergency. The surplus tax provision, making this almost impossible, places a heavy penalty on industries like ours, where earnings not distributed to stockholders are appropriated to the government in the form of taxes and these earnings are lost as a backwash for the industry.

"Its financial position must then be gauged purely on current business. Its credit will fluctuate with the volume of orders, or lack of them. Without means to finance employment in dull times, its employees will suffer the same risks as the stockholders: no orders, no work, no dividends, and no purchasing power. The possibilities that this surplus earnings tax carries for hastening and prolonging depressions are appalling, and certainly were not taken into consideration by the authors of the bill which was so hastily put through to become a law.

"***The normal growth of a corporation is ordinarily financed out of surplus. We are now told that industrial expansion should be paid for out of the sale of new securities.***A large corporation with a national reputation can easily find a market for its securities. It is extremely difficult for the small concern to raise capital in this way.

"The net result is to favor the expansion of large corporations at the expense of the smaller ones, and the smaller ones are essential to our national well-being. **These small corporations are not only employers of thousands of people, but they represent the most effective check on the trend toward monopoly."

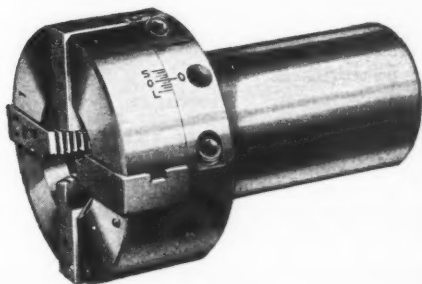
Revision of this Act is necessary. Let's have some action!

SCREW THREADING

with

Adjustable

TOOLS



Clean, accurate threads at the lowest possible cost—that's what you want when you buy threading tools. But solid dies and taps wear down and lose their accuracy, and they cost more than a set of chasers for a Geometric solid adjustable tool.

With the DJ Die Heads and SJ Taps, the Chasers are easily removed, making accurate resharpener simple. Better manufacturing methods are possible, too, so that we can guarantee the accuracy of the chasers. The chasers can be adjusted in the tool with precision—they can't lose size! And a single tool will cut a wide range of sizes.

Geometric adjustable tools are strong and sturdy, with rigid chaser support and positive locking, yet small and compact. When small production or space limitations prohibit the use of self-opening tools, or on short threads where backing off is not objectionable, a Geometric solid adjustable tool is more accurate, more economical, than a solid die or tap. May we send you catalogs?



THE GEOMETRIC TOOL CO.

NEW HAVEN, CONN.

New Shop Equipment

Ex-Cell-O New Line of High Speed Multiple Boring, Facing and Turning Machines

An entirely new line of high production, high speed, multiple boring, facing and turning machines has been added to its precision boring machine line by Excello Corporation, 1202 Oakman Blvd., Detroit, Mich. The new line comprises

carriers in a total cutting time of only around 37 seconds.

In the three-way machines, shown in Fig. 1, it will be noted that the boring spindles with their individual motor drives are separately mounted on sliding tables. Table feed is by the well-known Ex-Cell-O hydraulic system with individual hydraulic pumps for each table. Standard Ex-Cell-O precision ball bearing spindles are used mounted in special

heads for compactness and so designed that additional spindles may be added if required.

Cutting cycles are completely automatic. Each table is provided with micrometer-adjustment dogs for setting the distance for fast approach, cutting, dwell, and fast return. The dwell period at the end of the cutting stroke is separately adjustable for anything from one to 30 seconds to insure desired finish characteristics with a minimum of time per operation. A rapid advance between two holes bored by one spindle may also be provided for in the cycle.

Spindle speeds are constant for any particular job, and designed to give a cutting speed of around 400 feet per minute with carbide cutting tools. Feeds may be varied from nothing to 42 inches per minute to meet any requirements as to materials to be cut as well as type of work and character of finish required. If high speed cutting steels are to be used, lower spindle speeds are, of course, provided.

Individual starting controls of the push button type are provided on the control panel shown for the electric motors operating the spindles and pumps, with two additional buttons permitting simultaneous starting and stopping of all motors.

A similar flexibility is incorporated in

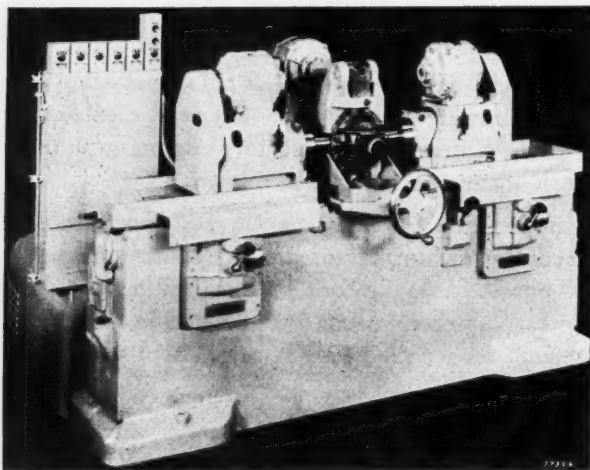


Fig. 1—Ex-Cell-O Three-Way High Speed Multiple Boring, Facing and Turning Machine

both two and three-way types, with from two to nine boring spindles.

For parts requiring boring, turning or facing operations from more than one direction, the machines eliminate the possibilities of errors in machining arising from locating parts in separate fixtures on different machines for individual machining operations. For parts requiring operations from one side only, multiple fixtures provide much higher productivity per machine hour.

Notable among the features of the new line is the unusual compactness of these highly flexible units and the high productivity possible, exemplified by the complete boring and facing, in one setup, of such parts as differential

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the table travel controls. Each table is provided with a separate lever control to permit individual operation, or all three tables may be started and stopped with a single lever shown to the right of the hand-wheel in Fig. 1. The individual controls, of course, are highly valuable in setting-up or re-tooling any individual carrier. Furthermore the controls are adjustable that carriers may either be fed in simultaneously or in rotation.

The machines illustrated here are equipped for dry cutting. A sump is provided in the base of the machine,

however, to permit installation of a coolant system. In that case the coolant pump is driven off one of the hydraulic control pump units. Chips drop down through the top of the machine and are ejected out the back of the machine through slides shown adjacent to the center limit.

Parts are clamped in stationary fixtures, those shown being of the manual type, although both hydraulic or air-operated fixtures may be used, synchronized with the cutting cycle.

The T-shaped base of the 3-way type is cast in one piece of nickel chrome alloy iron and is aged in addition to being normalized. It is liberally webbed for maximum rigidity. Force feed lubrication is provided for the table ways, one of which is flat; the other V-shaped. The entire machine is designed to provide the maximum in smooth and vibrationless operation for high precision work.

Spindles are universally adjustable vertically and axially as well as transversely. Holes from $\frac{3}{8}$ in. up to six in. diameter may be bored. Maximum table travel is 12 in. A fixture pad of 6x15 in. provides ample support for large fixtures to handle large parts. Return speed and rapid approach is 11 ft. per minute.

The two-way type is similar in design to the three-way model. In this type two hydraulic pumps are provided, alongside of the base, back of the machine. In the case of the three-way machine, it is adaptable to a wide variety of multiple boring, facing and turning operations. In this machine, also, cutting

operations may be simultaneous from both sides or alternately, as desired. The machine may be used equally advantageously for two-way machining of a single part, requiring counter-boring, for instance, or for simultaneous or alternate machining of separate parts to permit processing of one, while loading the other.

For continuous production, this two-way type can be equipped with a vertical or horizontal multi-station, rotary indexing fixture permitting the performance of a multiplicity of boring, turning and facing operations.

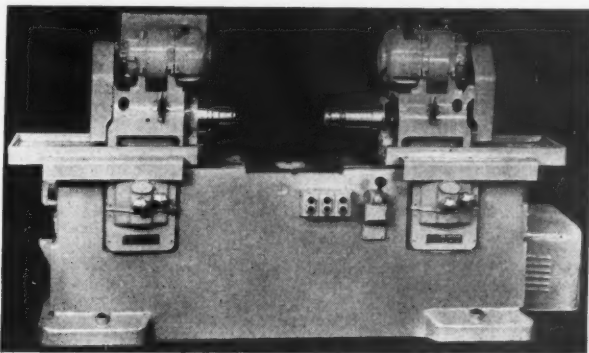


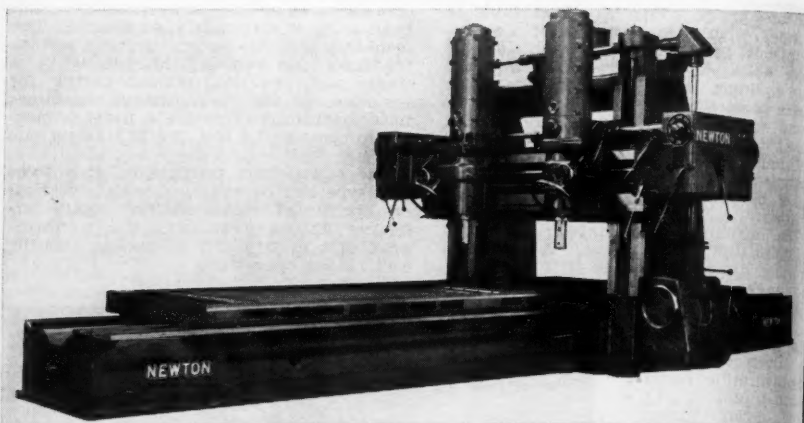
Fig. 2—Ex-Cell-O Two-Way High Speed Multiple Boring, Facing and Turning Machine

The Two-Way Precision Boring machine is available in a number of different sizes to accommodate varying sizes of work.

Newton Two-Head Planer Type Drilling and Boring Machine

The machine illustrated herewith has been brought out by Consolidated Machine Tool Corporation, Rochester, N. Y., for the precision drilling and boring of large castings where numerous holes must be accurately positioned, drilled and bored. The outstanding feature of the machine is the provision made for precision positioning. Both heads and table are provided with a hand wheel and both are equipped with end measures, inside micrometers and dial indicators. The boring bars are provided with power rapid traverse vertically and heads have rapid traverse across the rail. Rail and tables are each provided with power feed and traverse.

Operation of the machine is facilitated



Newton Two Head Planer Type Drilling and Boring Machine

by large dials which can easily be read from the floor. Dials on each head indicate directly in r. p. m. the speed of the spindle at all times. Large dials on each gear box show the feed per revolution.

Boring bars carried in two saddles are double-splined to fit the driving gears, which have extended hubs mounted in precision Timken bearings. At the upper end of each bar is an additional bearing ring in a slide with roller thrust collars to take the thrust of the cut. The right hand head is operated from the gear box at the right hand side of the rail and control of the left hand head is from a gear box at the left end of the rail.

The table can be built in one piece or in two sections as illustrated. The two sections can be coupled together or used separately so that one can be loaded while the other is in use. Tables are mounted on one V and one flat way and continuous feed for the combined length is provided through the angular rack under each table. Tables are also equipped with milling feeds through a worm and rack drive to provide for milling the sides of castings where a side unit milling head is desired.

Crossrail, uprights, girt and bed are of heavy box section. Reinforcement is generously provided through heavy cross ribs, thus insuring utmost rigidity. Two adjustable speed motors are required for the driving heads, and the rail and one constant speed motor are required for driving the table. A small motor is also required for rapid traverse of the rail.

The two rail gear boxes are lubricated

by self-contained pump, and the table gear box is splash lubricated. Forced feed lubrication is provided for the bed ways. All other points are lubricated by means of a centralized one-shot system. The machine can be built in a range of sizes to meet specific requirements.

"Toledo" No. 57-A Single and Double Action Press

For general utility purposes, the single action press with built-in drawing cushions to do double action work has become increasingly popular. A new design of the popular "Toledo" No. 57-A press, shown herewith, brings out some interesting angles on this combination. The press, product of Toledo Machine & Tool Co., Toledo, Ohio, is fitted with a semi-built-in heavy duty "Marquette" hydro-pneumatic die cushion. In the high range this cushion gives about double the normal blankholding pressure, adapting the unit to shape-stretching jobs which require a very high gripping pressure around the edge of the blank. On such work it is entirely possible to use gripping pressures equal to or exceeding the drawing pressure.

The use of high blankholding pressures, particularly with deep draws, involves a decided increase in capacity of the whole driving train on the press, including the flywheel and motor. For equivalent work this naturally puts the single-action machine and cushion in the price class of the equal double-action toggle press. Thus the single action

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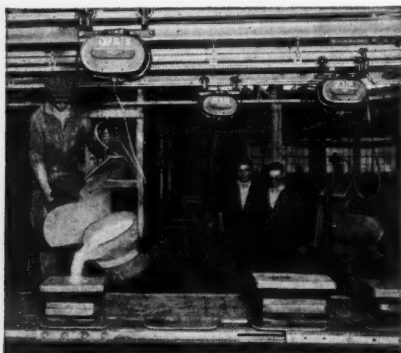
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In many cases where loads of 500 pounds or under are being handled by manpower or with inadequate mechanical assistance, a 1/4-ton Lo-Hed Hoist could do the work faster, more efficiently and more economically . . . For example, in one foundry 1/4-ton Lo-Hed Hoists operated by one man are used for pouring along mold conveyors. The operator can devote all his attention to maneuvering the spout into the right position for the important job of pouring. Look into the possibilities of the 1/4-ton Lo-Hed and of the other 97 standard Lo-Heds. Send coupon for new Lo-Hed catalog.



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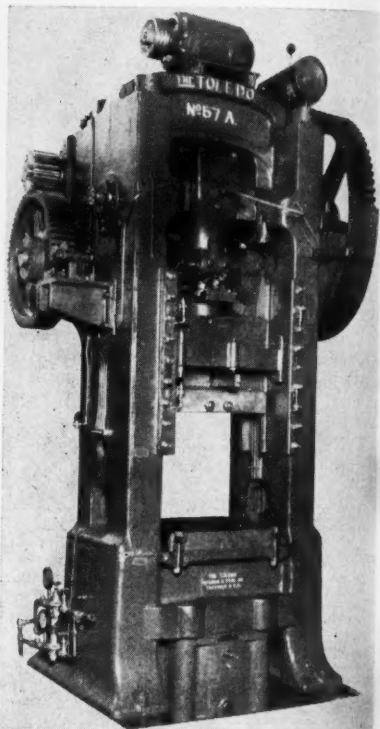
Company Address.....

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Your Title.....

has advantages in suitability to single action work and in convenient holding pressure control for double action work. On the other hand, the toggle double-action press has advantages in positive gripping for stretching jobs with draw beads and in power economy on deep draws.

The press shown in the photograph is manufactured by The Toledo Machine



Toledo No. 57-A Single and Double Action Press

& Tool Co., Toledo, Ohio, a division of E. W. Bliss Company. This press is a double-g geared, single end drive, single-action press with a gear ratio of 16 to 1, which gives a speed of 22 strokes per minute. The 10 h. p., 1200 r. p. m. high slip motor drives the flywheel by means of V-belts. Electric push buttons control the multiple disc air-operated friction clutch, making it possible to inch, run or stop the press. All main bearings are bronze-bushed and are lubricated by means of the manifold type one-shot



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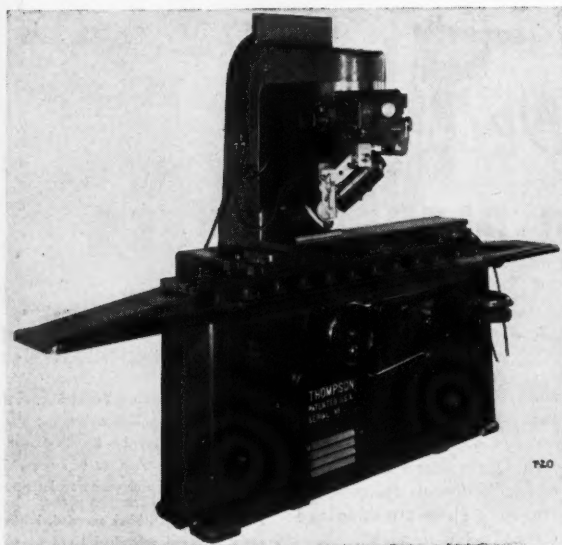
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City and State



ONLY A FINE PRODUCT MAY BEAR THE NAME ROEBBLING



Thompson No. T-20 Automatic Broach Grinding Machine

system. Some of the more important dimensions are as follows: Stroke, 10 in.; adjustable for 4 in.; shut height, stroke down, adjustment up, bed to slide 20 in.; bolster thickness, 4 in.; crankshaft, 6½ in. dia. at bearings and 9¾ in. at the pins; bed area, 32 in. by 32 in. The slide is counterbalanced by a weight in the gear wheel. The self-contained "Marquette" hydro-pneumatic cushion makes it possible to draw a shell up to 4¾ in. high.

Thompson No. T-20 and No. T-47 Automatic and Manually-Operated Broach Grinding Machines

The Thompson Automatic Broach Grinding Machine illustrated herewith has been designed by The Thompson Grinder Company, Springfield, Ohio, for the sharpening and manufacturing of flat or surface broaches. The machine is operated automatically and the tooth spacing is determined automatically.

A small locating finger positions the broach tool relative to the grinding wheel. The wheel head

is provided with a longitudinal slide and swivel to accommodate various tooth and rake angles. The entire wheel head unit may be adjusted in angular relation with the broach in order to grind the teeth at an established angle with the broach axis.

The table operates in timed relation with the stroke of the wheel head and can be operated at a variable speed. The wheel head is designed for 6-in. diameter grinding wheels and the spindle runs at a speed of 3600 r.p.m.

The No. T-47 Manually Operated Machine is so designed that the broach teeth are located according to a predetermined spacing or from established teeth. Both the automatic and the manually operated machines are built in 6x48-in., 6x60-in., and 6x72-in. sizes.

Marquette Compact Slide Cushion

The Marquette Tool and Mfg. Co., 1420 Hastings St., Toledo, Ohio (division of



Thompson No. T-47 Manually Operated Broach Grinding Machine

New STANLEY 7" Disc Sander



**THESE GEARS
Tell Only Part
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Gears are mighty important in a disc sander's life. That's why Stanley uses these spiral bevel gears for smoother action and long service. Motors are important, too! Stanley powered this tool with a motor similar to that used in the Stanley $\frac{1}{4}$ " Electric Drill. And mounted the shafts on oversize ball bearings designed to take the end and side thrust of the man who "leans on" this grinder.

Stanley No. 77 is a double handful of action — useful in any shop for sanding, grinding, buffing of steel sheets, castings, welded joints; for aluminum, bronze, fibre, and wood. Ask your Stanley distributor for a demonstration to prove that this tool is right in speed, in weight, in balance and power. Or write for further information. Stanley Electric Tool Division, The Stanley Works, New Britain, Conn.

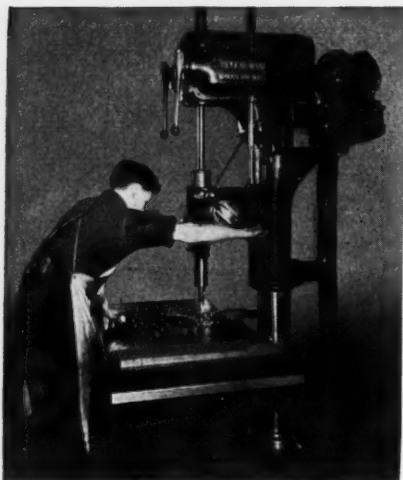


STANLEY ELECTRIC TOOLS



"COST LESS PER YEAR"

CLEEREMAN DRILLING MACHINES



SLIDING HEAD --

Round or Square Column

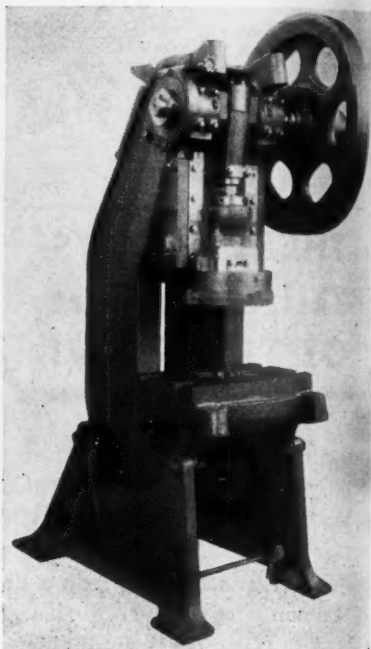
At work in the plant of the Brust Tool Manufacturing Company, Chicago, well known makers of precision tools and fixtures, this round column 25" Cleereman Drill is giving highly satisfactory performance . . . It is fully geared . . . has anti-friction bearings . . . is automatically oiled . . . has single lever control of feeds and speeds . . . can be furnished with square column and in special arrangements . . . Write for descriptive bulletin.

Cleereman Machine Tool Co.

Green Bay, Wis.

E. W. Bliss Co.), is announcing a compact pneumatic slide cushion. The cushion is mounted under the slide, as shown in the illustration, and can be used in conjunction with Calleson blanking, drawing and curling dies to replace the springs or rubber cushions. It is equally adaptable to stripping and blankholding operations.

The functioning of this cushion as a stripper has a number of advantages. No jacking-back of the stripper plate

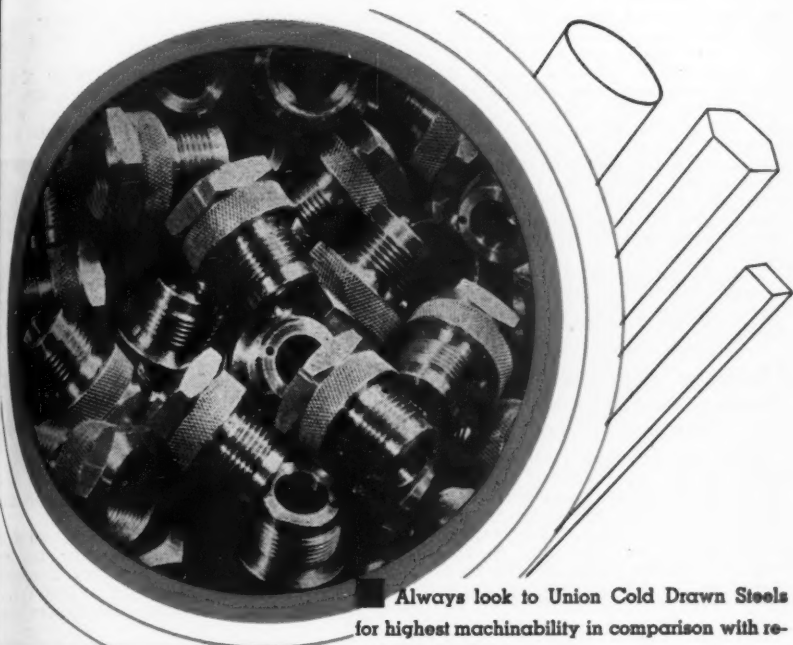


Marquette Compact Slide Cushion in Use on Bliss Press

against stiff springs is necessary when setting dies. All that is required is to release the air from the cushion and the stripper plate will easily slide back out of the way. Furthermore, it is possible to control the stripping in a positive manner so that the cushions will operate at the correct moment.

It is possible with the use of these slide cushions and the regular cushions in the bed to convert a single-action press into a triple-action press.

When these cushions are used with Calleson dies, the cushion and the drawing proceed downward together, blank-



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Union Cold Drawn Steels

ing and drawing the shell. In the next step, the upper draw ring recedes while the lower forming die, actuated by either air cushions or springs, pushes upward, forming the edge curl against the pressure of the slide cushions, pushing on the top of the cover. When the edge is completely curled, the slide cushion recedes with the upper draw ring while the lower forming die ejects the shell. The stroke of the slide cushion must be the length of the edge curl.

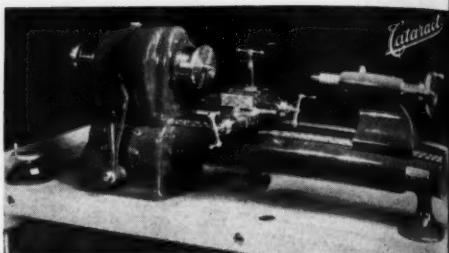
A flexible hose connects the cushion with the air supply. These cushions are built in all sizes.

Hardinge Preloaded Ball-Bearing Bench Lathe with Transitorq Drive

Hardinge Brothers, Inc., Elmira, N. Y., are presenting a preloaded ball bearing bench lathe with transitorq drive. The transitorq used in this drive is particularly adapted for bench lathe use and is the result of development work in which Hardinge Brothers and the New Departure Manufacturing Company have collaborated for this purpose.

The spindle is of the Hardinge super precision preloaded ball bearing construction.

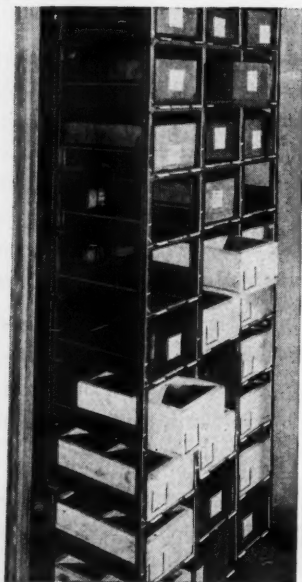
The transitorq has a range of 1:1 ratio between low and high speeds. The two-speed reversible motor has a 1:2 ratio, giving the machine spindle a 1:2



Hardinge Preloaded Ball Bearing Bench Lathe with Transitorq Drive

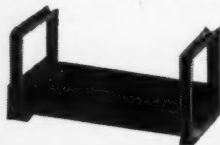
double speed range of 1:20 r. p. m. to 150:3000 r. p. m. with all intermediate speeds.

With the transitorq hand wheel set for 1000 r. p. m., changing the lever from low to high position instantaneously changes the speed to 2000 r. p. m. or vice versa. In other words, two speeds



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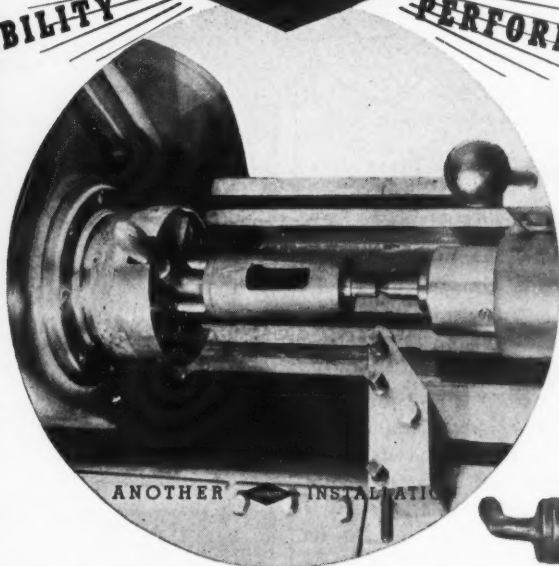
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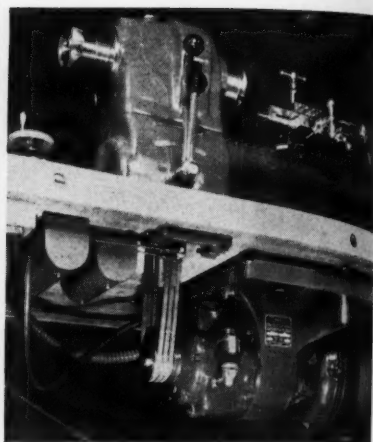
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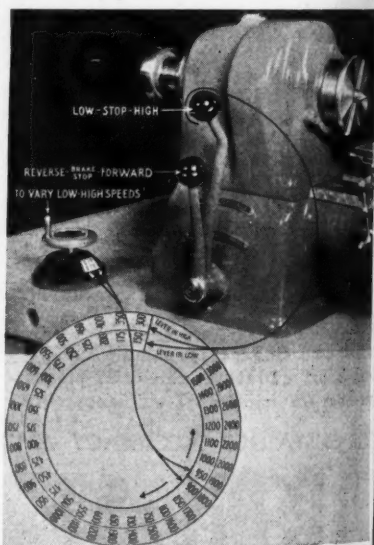
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View Showing Details of Drive

are available in each position of the transitory lever. The long lever gives low-stop-high speed change and the short lever gives reverse-brake stop-forward speed change. Levers operate electrical motor controls. The short lever applies a spindle brake.



Enlarged view of dial showing speed gradations. Any speed desired is available from 150 to 3000 r.p.m.

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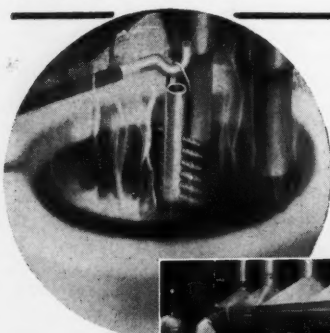
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THE REASONS WHY . . . Putnam Tools Cut Faster — Last Longer



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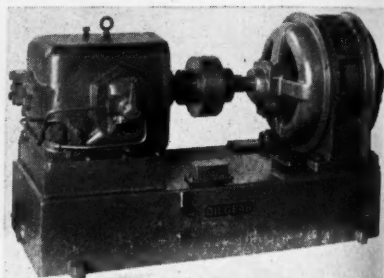
TOOL COMPANY

2981 Charlevoix Ave. • Detroit

The Hardinge design places the transitorq and motor underneath and toward the back of the bench out of the way of the operator's knees. The mounting for the transitorq and motor is completely rubber insulated against vibration. Provision is made for quick and easy adjustment of belts. The machine is offered in five sizes with $\frac{1}{2}$ to 1-in. collet capacity and 7 or 9-in. swing.

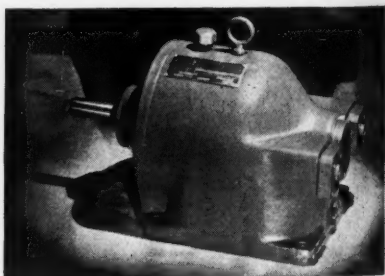
Oilgear Fluid Power Pumps and Motors

Oilgear Fluid Power Variable and Constant Displacement Pumps and Motors, marketed by The Oilgear Company,



Oilgear Type "DH-6017" Two-Way Variable Displacement Pump

1323 W. Bruce St., Milwaukee, Wis., are of the proven radial multiple piston type which have established new standards of size, speed, performance and low



Oilgear Type "C-811" Constant Displacement Motor

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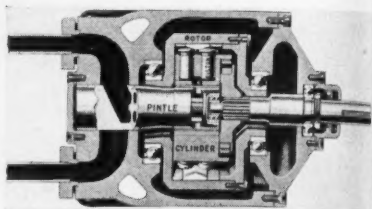


No more wasted time looking for different size dies to thread 1", 1 1/4" or 1 1/2" pipe. Simply move the setting post of your No. 65R to the pipe size you want. One set of dies instead of 4—one-fourth the bother. Thousands of users like the new-style workholder, too. Twist to pipe size, tighten one screw—quick and easy. No. 65R cuts clean accurate threads in all variations. A time, temper and money saver. Buy from your jobber.

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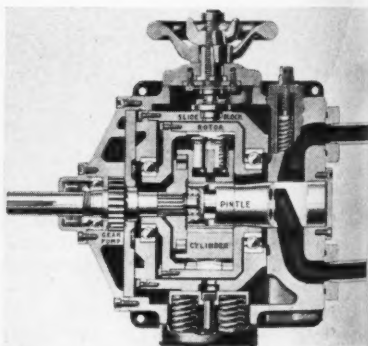
on top of the piston is accurately finished to work with the conical surface of a hardened and ground reaction ring. Piston reactions are transmitted from a single spot on the convex surface of the head to the concave surface in the reaction ring. This contact spot being offset from the axis of the piston and the rotor unit being eccentric from the cyl-



Plan View of Section of Oilgear Constant Displacement Unit

inder block causes the piston to reciprocate and partially rotate back and forth simultaneously. Both of these motions are uniformly accelerated and decelerated. The action imparted is similar to that used in lapping a small piston into its cylinder, the extent of each motion being governed by the stroke of the pump.

Likewise, the hardened and ground



Plan View of Section of Oilgear Variable Displacement Unit

reaction ring is of one-piece construction securely mounted in a rotor running on anti-friction bearings. The conical surface is ground to work with the convex surface of the rolling pistons.

Since the rolling pistons are small many can be placed in the cylindrical

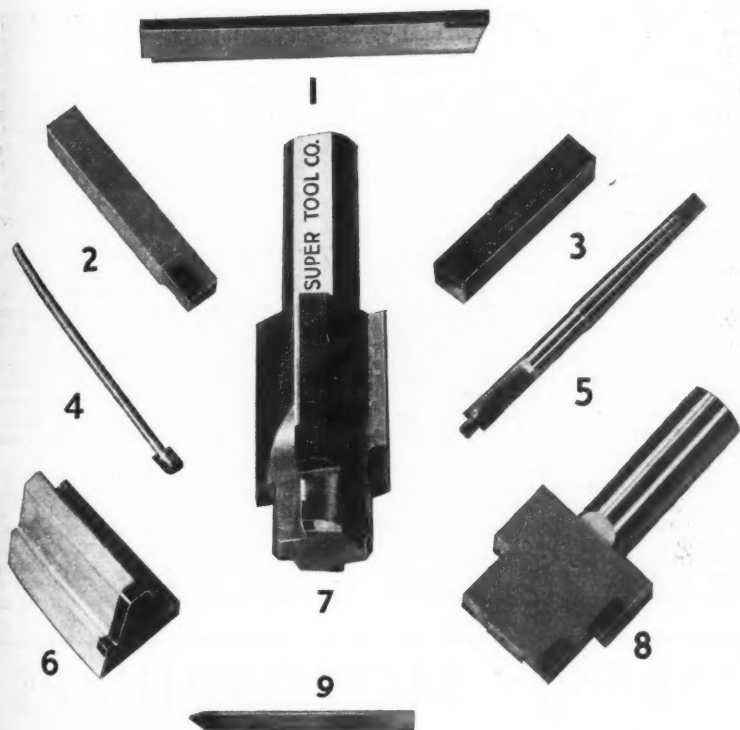
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SUPER TOOL COMPANY

356 EAST CONGRESS ST. • DETROIT, MICHIGAN

area of the cylinder and additional rows can be placed compactly in the longitudinal section of the cylinder. This makes possible a line of compact pumps and motors in conventional sizes from 2 to 150 h. p. with working pressures of 1100, 1700 and 2500 lbs. per square inch.

Smoothly and quietly the balanced rotor revolves on anti-friction bearings mounted on a fixed center in the case or in a movable slide block to vary the stroke. Interchangeable devices of various types flanged to the unit case select the movement of the slide block and provide accurate direct or remote control of the fluid power function.

Oilgear Variable Displacement Pumps and Motors consist of a variable stroke piston unit and a suitable control mechanism compactly arranged in a case. Each variable displacement unit consists of a pintle, a cylinder barrel with seven or more closely fitted pistons, one or more reaction rings, a rotor and slide block. The cylinder barrel lined with anti-friction metal rotates on a fixed alloy steel hardened and ground closely fitted pintle, which is pressed into the case. A floating coupling flange, splined to the input shaft, which is mounted on anti-friction bearings, drives the cylinder barrel. Centrifugal force keeps the convex surfaces of the roller-bearing

alloy steel hardened and ground rolling pistons against the concave surface in the reaction ring at all times. The rotor and rotor end head which contain the reaction rings are mounted on large anti-friction bearings and rotate with the cylinder barrel through contact of the rolling pistons against reaction rings. A slide block mounted between four horizontal ways in the case and connected to the control mechanism carries the complete rotor unit and is used to vary the stroke of the pistons.

The illustration shows the Oilgear Variable Displacement Unit with the simple Type "S" Hand-Wheel Screw Control which consists of a large screw flanged to slide block, a long working nut, a hand-wheel and lock nut. This hand wheel provides accurate control of the slide block position and hence the volume of oil displaced. Compression springs opposing the control hold the slide block firmly against the control mechanism.

Built into each front housing is an internal gear pump for partially supercharging the main system and for operating hydraulic controls. On one-way variable displacement pumps a combined suction and return valve is flanged to the bottom of the case. Two-way variable displacement pumps use an auto-

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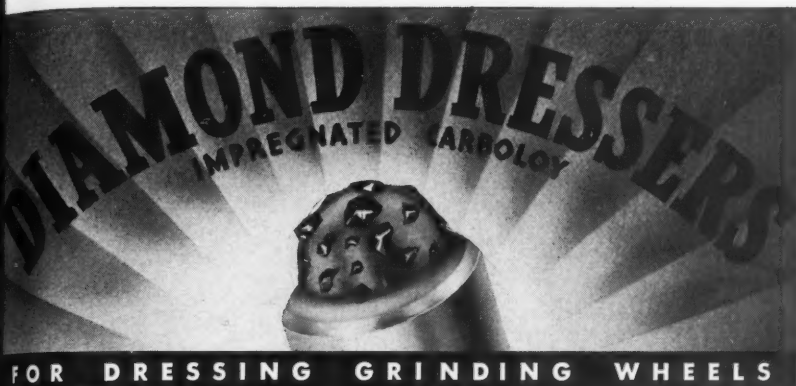


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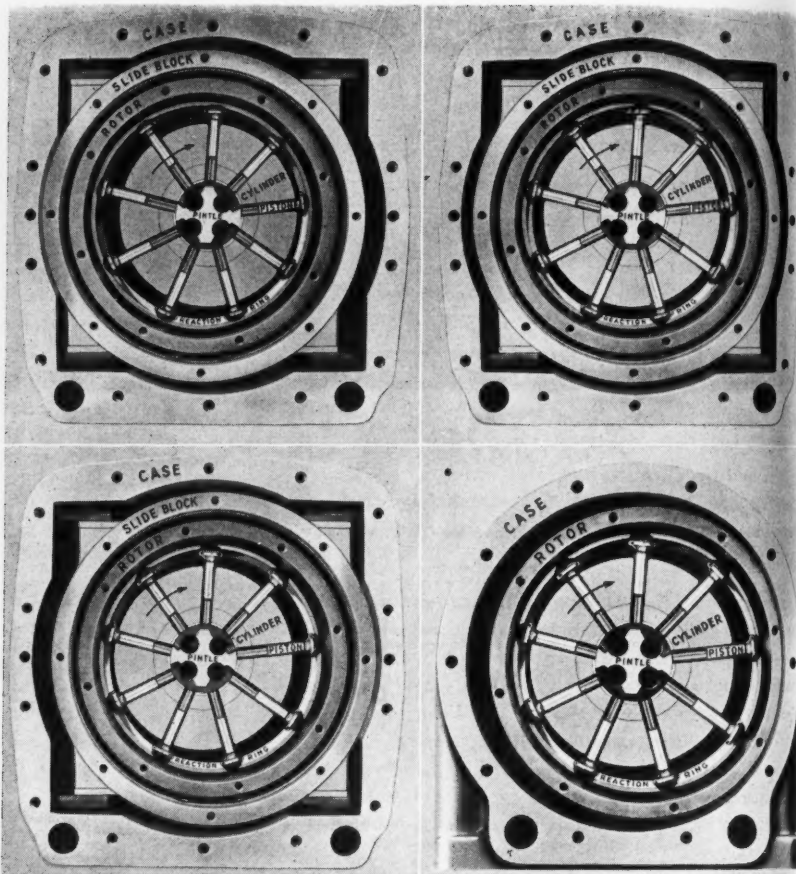
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Oilgear Variable Displacement Pumps. (Upper left) View showing slide block, rotor and reaction ring unit with its centerline moved to left of cylinder, pintle and drive shaft centerline. Oil is delivered through upper port. (Upper right) View showing slide block, rotor and reaction ring unit with its centerline concentric with cylinder, pintle and drive shaft centerline. Neutral—no oil is delivered. (Lower left) View showing slide block, rotor and reaction ring unit with its centerline moved to right of cylinder, pintle and drive shaft centerline. Oil is delivered through lower port. **Oilgear Constant Displacement Pumps.** (Lower right) View showing rotor and reaction ring unit with its centerline at a fixed eccentricity to right of cylinder, pintle and drive shaft centerline.

matic two-way suction and return valve. These connect with the main system through drilled and cored passages. Suitable suction and return tubes are also supplied. Built into the case and connected to the main system through drilled and cored passages are relief valves for limiting the pressure of the variable displacement unit and auxiliary gear pump.

Variable displacement motors are similar to the pumps except that they require no suction and return valves. They come equipped with or without an internal gear pump.

Each constant displacement unit consists of a pintle, a cylinder barrel with seven or more closely fitted pistons, one or more reaction rings and a rotor. The cylinder barrel lined with anti-friction

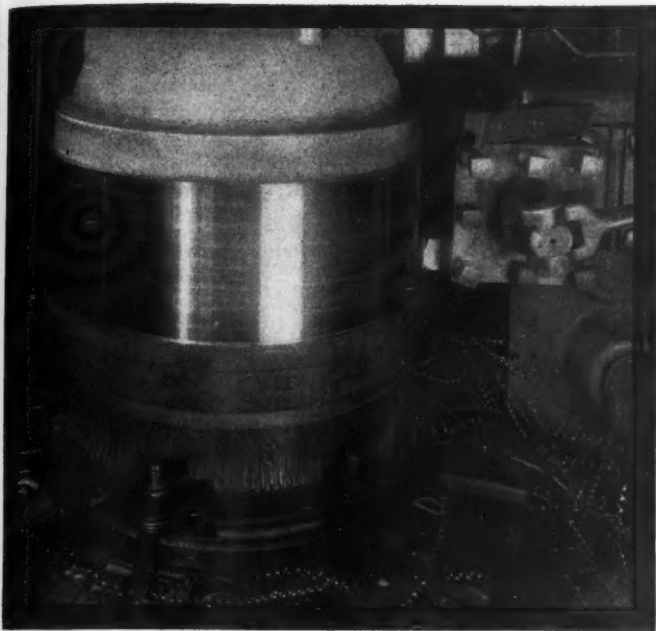
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Finish turning O.D. of ring gears, .670" thick, eleven rings on fixture per load. Material: S.A.E. 1045, Brinell 170-187. Tool used: V-R, Grade E, Style 11, $1\frac{1}{4}" \times 1\frac{1}{4}"$ with 28° chip breaker. Performance of V-R tool:

Tool Used	Speed	Feed	Depth of Cut	Cutting Time, Load	Production per Grind
V-R Grade E	305 S.F.M.	.027"	$\frac{1}{8}"$	3.50 Min.	20 Loads—220 Pieces

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metal rotates on a fixed alloy steel hardened and ground closely fitted pintle, which is pressed into the case. A floating coupling flange, splined to the input shaft which is mounted on anti-friction bearings, drives the cylinder barrel. Centrifugal force keeps the convex surfaces of the roller bearing alloy steel hardened and ground rolling pistons against the concave surface in the reaction ring at all times. The rotor and rotor end head which contain the reaction rings are mounted on large anti-friction bearings in the case at a fixed stroke and rotate with the cylinder barrel through contact of the rolling pistons against the reaction rings.

One-way or reversible constant displacement pumps come equipped with an external flanged type adjustable relief valve for limiting the pressure in the system. They are available with or without an internal gear pump and built-in relief valve.

In Oilgear Variable Displacement Pumps, the pump shaft is driven clockwise from any constant speed source of power. This rotation is transmitted directly to the cylinder barrel mounted on the fixed pintle in the case through a splined floating coupling flange. Radial pistons in the driven cylinder barrel are confined in the rotor by concave reac-

tion rings while the rotor is carried on anti-friction bearings in the adjustable stroke slide block. Oil is carried to and from pistons through flanged pipe connections, cored passages and drilled passages in the case, pintle and cylinder.

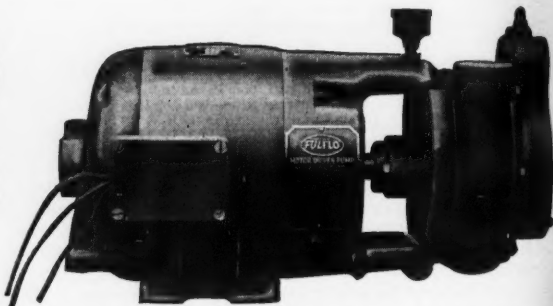
When the centerline of the cylinder and rotor coincide, no reciprocating motion is imparted to the pistons as the unit rotates, so no oil is delivered. As the slide block and rotor unit are moved to the left by the control mechanism, reciprocating motion is so imparted to the pistons that those passing over the upper port in the pintle are delivering oil to that port while those passing over the lower port are sucking or filling up with oil. When the centerlines of the cylinder and rotor do not coincide, the differences between the radii from the center of the cylinder to the points of contact of the several piston heads with the conical reaction ring surface in the rotor unit cause the piston heads to move faster or slower than their points of contact with the reaction ring. This difference in speed is adjusted by slow partial rotation of each piston in its bore, in one direction during one-half revolution and in the opposite direction during the other half revolution. The pistons thus rotate and reciprocate simultaneously.



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The Pumps of well balanced design and construction. They can be mounted in any position and perform to perfection.

Regardless of grit and chips centrifugal pumping action insures dependable flow of cooling solution at all times.



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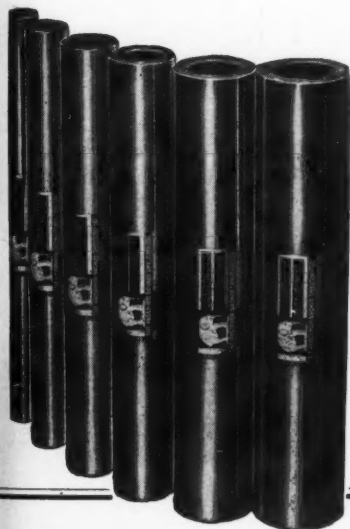
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As the slide block and rotor unit are moved to the right of the cylinder barrel centerline by the control mechanism, reciprocating motion is so imparted to the pistons that those passing over the lower port in the pintle are delivering oil to that port, while those passing over the upper port are sucking or filling up with oil. The position and movement of the slide block is controlled very accurately, thus permitting the oil delivery to be varied smoothly over a stepless range in either direction from zero to maximum.

In the Oilgear Constant Displacement Pumps, the pump shaft is driven clockwise or counterclockwise from any constant speed source of power. This rotation is transmitted directly to a cylinder barrel mounted on the fixed pintle in the case through a splined floating coupling flange. Radial pistons in the driven cylinder barrel are confined in the rotor by concave reaction rings while the rotor is carried on anti-friction bearings mounted in the case at a fixed eccentricity. Oil is carried to and from the pistons through flanged pipe connections, cored passages and drilled passages in the case, pintle and cylinder.

When the pump shaft rotates clockwise, reciprocating motion is so imparted to the pistons that those passing over

the lower port in the pintle are delivering oil to that port while those passing over the upper port are sucking or filling up with oil. Since the centerlines of cylinder and rotor do not coincide, the differences between the radii from the center of the cylinder to the points of contact of the several piston heads with the conical reaction ring surface in the rotor unit cause the piston heads to move faster than their points of contact with the reaction ring. This difference in speed is adjusted by slow partial rotation or rolling of each piston in its bore, in one direction during one-half revolution and in the opposite direction during the other half revolution. Thus, the pistons rotate and reciprocate simultaneously.

Driving the pump shaft counterclockwise causes the pistons passing over the upper port in the pintle to deliver oil to that port, while those passing over the lower port are sucking or filling up with oil.

No. 14 Producto-Matic Knee Type Milling Machine

A knee and column type milling machine in a light design with power feed to the table, to be known as the No. 14 Producto-Matic, has been added to

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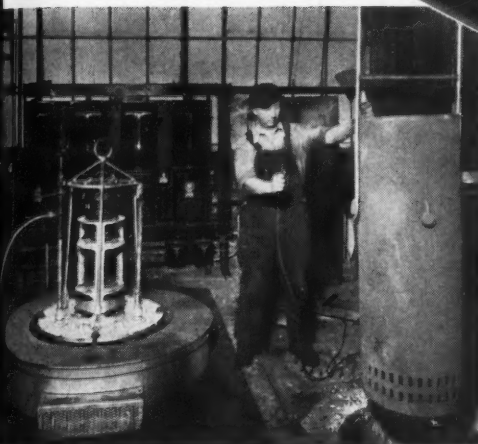
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A Hevi Duty Vertical Retort Carburizer at the Cleveland Pneumatic Tool Co. Many of the important parts of "Cleco" tools are carburized in this furnace because of its dependability to consistently produce a uniform case.

Send for Bulletin HD 937. It describes the Vertical Retort Carburizer.

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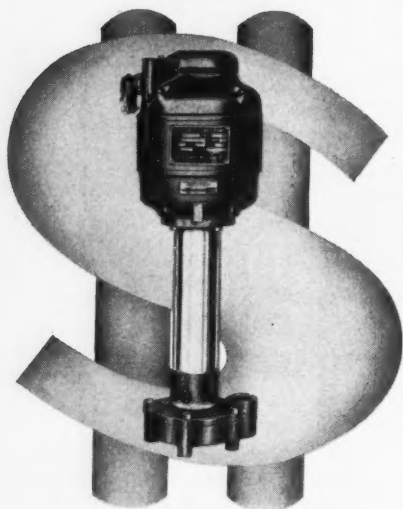
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The RUTHMAN MACHINERY Co.

538 EAST FRONT STREET CINCINNATI, OHIO

the line of machine tools built by The Producto Machine Company, Bridgeport, Conn. The machine is of compact design with a one-piece column which encloses the motor, oil pump and reservoir, complete transmission for controlling spindle speeds and table feeds, and acts as a substantial support for the knee, saddle, gear box and table.

Possibly the most interesting part of the construction comprises the use of V-pulleys and belts to secure 12 changes of spindle speeds and 6 changes of table



No. 14 Producto-Matic Knee Type Milling Machine

feeds. The feeds or speeds are changed by simply shifting the belts from one step to another and by reversing the pulleys the number of changes can be doubled. A powerful, steady, quiet and self-contained drive is provided to the cutter spindle and to the gear box controlling the table feed.

The speed of the motor is 1200 r. p. m. There are 12 spindle speed changes giving speeds from 72 to 1300 r. p. m. Table feeds are provided giving table feeds varying from $1\frac{1}{4}$ to 11 in. per minute. All pulleys and shafts in the transmission rotate on anti-friction bearings in a bath of oil. The cutter spindle, which is alloy steel hardened and ground all over, rotates on two Timken roller bearings which are constantly lubricated. The spindle end has a No. 40 National Standard Taper.

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The table feed mechanism consists of a telescopic universal drive shaft from the transmission into the gear box, which is mounted on the under side of the saddle. The overarm is 3-in. diameter and has a large support for the cutter arbors. Either a standard center or a support with bronze bushings for style A or B cutter arbors is used. The machine accommodates standard attachments and tools such as a vertical milling attachment, 5-in. swivel vise, 6-in. universal index centers, end mill adapters, standard cutter arbors, and so on. The base of the machine is 32x28 in. and the height to top of column is 53 in. Floor space required, 47x37 in. Range of the longitudinal power feed table is 14 in., with 16 in. obtainable. Cross feed range, 7 in. Vertical feed of table, 12 in. Distance from face of spindle to center of table: minimum, 4 in.; maximum, 11 in. Overall dimensions of table, 31x9 in. Working surface, 26x6 in. Cutter spindle, 2-in. diameter x 18 in. long with No. 40 National Standard Taper hole. Net weight, approximately 1550 pounds.

Automatic Machine for Fluxing

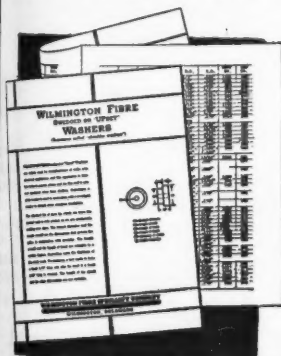
The Automatic Gasflux Company, Cleveland, Ohio, is marketing a machine

designed to automatically dispense brazing flux. The gas line runs through the machine and as the gas passes through it is impregnated with a special flux. The flux then travels with the gas to the torch tip and is expelled in the flame.

The special flux used is the result of long experiment by Gasflux engineers. It has a low melting point and as a result, coupled with the fact that it is dispensed in a minimum quantity heretofore unobtainable, the flux creeps ahead of and is always under the brazing puddle. It is said to penetrate thoroughly and quickly, preparing the metals in such a way that an unusually tight weld is secured.

The value of low temperature brazing has long been recognized, particularly in joining dissimilar metals or light and heavier gauge metals where the amount of heat applied becomes an important factor. This process, by speeding up low temperature brazing, is said to overcome the heat factor. The new process accurately and automatically controls the amount of flux used, making it impossible to use too little or too much and eliminates the depositing of the hard, enamel-like substance which often forms when an excess amount of flux is used. Thus no pickling is necessary and

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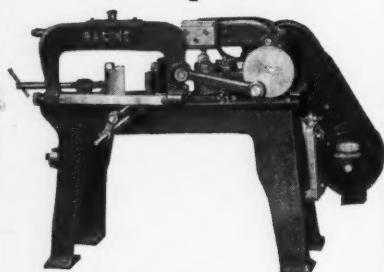
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very little grinding is needed. The uniformity and quantity of flux distribution governs the porosity and surface condition of the brazed joint.

The Gasfluxer and Gasflux can be used with all types of equipment



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L-W 10½-In. Full Universal Dividing Head

The full universal dividing head shown in the illustration in 10½-in. size has been placed on the market by L-W Chuck Company, 20 N. St. Clair

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Cleveland

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St., Toledo, Ohio. This full universal head is intended for use on all kinds of indexing and spiral cutting. The rear



L-W 10 1/2-In. Full Universal Dividing Head

end of the spindle has a No. 10 B & S taper and an arbor can be furnished for differential indexing, making a wide variety of indexing available. Three index plates are furnished dividing all numbers to 50 and even numbers to 100, excepting 96. The index chart furnished gives all divisions obtainable up to 380 with full instructions for obtaining the divisions desired.

The headstock is graduated to 120 deg. and is built so that it can be tilted above and below the vertical and perpendicular lines. The worm is hardened and ground, accurately cut and adjustable for wear and takeup through an eccentric bushing. The worm is easily disengaged by simple movement and locking device. Worm wheel ratio is 40:1. It is keyed to the spindle assuring positive movement when engaged by the worm.

The spindle has a tapered bearing and a thrust collar is provided to take up end thrust. A 2 1/4 in. pitch thread is provided on the spindle. Although listed as 10 1/2 in., the head actually swings 11 in. All material and workmanship are of the highest quality and every part is carefully inspected before and after assembling.

Equipment includes a set of change gears, quadrant, and idler bushings. A spindle arbor for differential indexing can be furnished on order. Shipping weight, 180 pounds.

High Speed Tapping Plus Revolutionary Flexibility

No wonder announcement of the Proconier Universal Tapping Machine has produced a cyclone of interest! Just consider these features:

- Five speeds, ranging from 385 to 2240 R.P.M.
- Tap capacity from No. 8 to 5/8" using two interchangeable heads.
- Preset feeding and backing out pressures, independent of operator, uniformly maintained thru long helical springs with wide range of adjustment.

- New protection for taps through Proconier Sensitive High Speed Tapping Heads.
- Automatic lubrication of tap with accurate timing and volume adjustments.

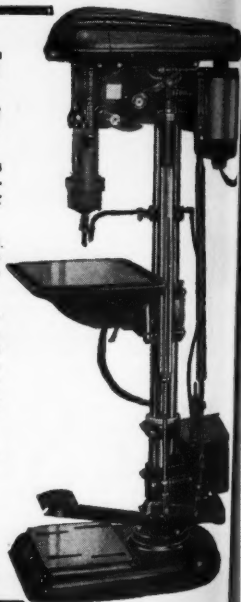
Other valuable features include foot pedal operation, precision depth stop with calibrated depth indicator, large working table with integrally-cast drain trough and precision hand-screw height adjustment.

Catalog mailed promptly on request.

PROCUNIER SAFETY CHUCK CO.

12 S. Clinton St.

Chicago





.. Exceptional
CENTERLESS GRINDING WHEELS

For outstanding performance specify ABRASIVE COMPANY GRINDING WHEELS on your production centerless jobs. Recent tests clearly show exceptional results that mean real economy. Details sent on request.

ABRASIVE COMPANY

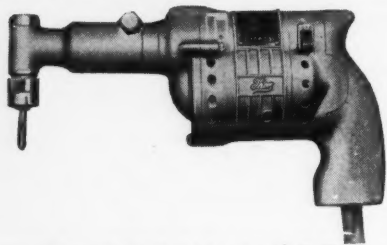
TACONY AND FRALEY STREETS, PHILADELPHIA, PA., U. S. A.

DIVISION OF SIMONDS SAW AND STEEL COMPANY



Thor U14R Right Angle Portable Electric Drill

Having a possible working clearance of only $2\frac{3}{8}$ in., the Thor U14R $3/16$ in. and $\frac{1}{4}$ in. capacity right-angle portable



Thor "U14R" Right Angle Drill

electric drill which has just been brought out by the Independent Pneumatic Tool Company, 600 West Jackson Blvd., Chicago, Ill., is said to have the smallest working clearance of any right angle drill on the market. The drill head on this new unit measures only $2\frac{1}{2}$ in. overall and the angle attachment can be turned and clamped into any position, making it possible to drill

in places formerly inaccessible.

This addition to the extensive Thor line weighs only 3 pounds and is but $9\frac{1}{4}$ in. overall. The streamline design and compact construction permit perfect one-hand operation. Equipped with $1/16$ in., $3/32$ in., $\frac{1}{8}$ in., $5/32$ in. and $3/16$ in. collets for twist drills, it offers a wide drilling range. It can also be supplied with spindle to take $3/16$ in. chuck. Spindle offset is $13/32$ in. The U14R operates at a speed of 2700 r. p. m. It can also be furnished with speeds of 3750 r. p. m. (U13R) and 5100 r. p. m. (U15R). Construction features include triple-insulated hand-wound armature, commutator built on brass sleeve to eliminate high bars and floating segments, alloy-steel, spiral helical gears and radial vent cooling system.

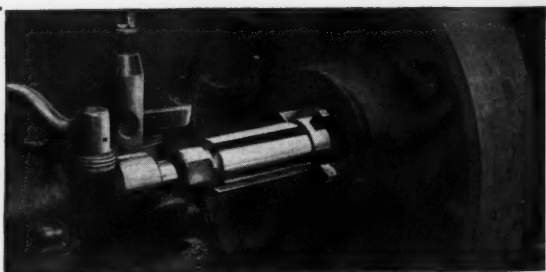
Sabin Type A3 Hand Truck

The Sabin Machine Co., 6538 Carnegie Ave., Cleveland, Ohio, has recently placed on the market its Type A3 Truck, adapted for convenient and speedy handling of wood or steel barrels and drums from keg size to 36 in. high.

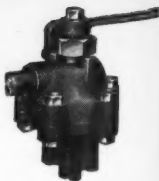
This new truck is featured by an attachment device consisting of a hook and a tongue member adjustably

With NICHOLSON EXPANDING MANDRELS

you have available for immediate use internal chucks for holding any hurry-up break-down job that comes along. Can be used on lathes, grinders, shapers or millers. Take any bore— $\frac{1}{2}$ " to 7". Made in fourteen sizes. Bulletin 530.



3 and 4-Way CONTROL VALVES for operating single or double acting air, steam, water or oil cylinders. Made in lever, foot, solenoid and motor operated. All pressures up to 3000 lbs. Bulletins on request.



Other Products: Arbor Presses, Flexible Couplings, Steel and Stainless Ball Floats, Steam Traps and Separators, Air Separators, Traps and Vents, etc.

W. H. NICHOLSON & CO. 136 OREGON STREET, WILKES-BARRE, PENNA.

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BARNES

BETTER *Hack Saw*

BLADES



Finer than hair-splitting—that's how accurate Barnes "Red Arrow" Blade performance is. And that's because "Red Arrows" are carefully made of the best high speed steel, with teeth properly milled, accurately set. Your supply dealer can introduce you to this top-notch among hack saw blades.

W. O. Barnes Co., Inc., Detroit, Mich.

The Cincinnati



**WET
ABRASIVE**

**CUT-OFF
MACHINE**

FOR SAFE, SPEEDY— LOW COST CUTTING

of steel alloys, non-ferrous and fibrous materials of all kinds in various sizes, angles, and shapes up to 3 1/2" inclusive. Machine is built to carry abrasive wheel 16" diameter by 3/32" or 1/8" thick. Vise for straight or angle cuts up to 45° is standard equipment.

Send for Bulletin giving complete description of this machine.

THE CINCINNATI ELECTRICAL TOOL CO.

Division of The R. K. LeBlond Machine Tool Co.
CINCINNATI, OHIO, U. S. A.

BUILDERS OF

The Cincinnati

Ball Bearing Electric Drills, Screw Drivers, Nut Setters, Tappers, Valve Grinders, Aerial Grinders, Tool Post Grinders, Floor Buffers, Bench and Floor Grinders.

mounted on the vertical column. In operation, the tongue member is positioned about one inch above the lower edge of the barrel chime while the truck is held against the barrel at both top and bottom. The hook is then placed over the edge of the barrel and the wheels allowed to roll back until the tongue slips under the lower edge of the chime. By means of the handle and the



Sabin Type A3 Hand Truck

foot pedal the wheels are now pushed up to the load, which is thus raised off the floor and attached to the truck. It is then quickly tipped to the balancing position and easily moved.

The wheels are 10 in. by 3 in. mounted on roller bearings, and can be furnished with steel, hard-rubber or pneumatic tires. The axle is 1 1/4 in. in diameter and the overall width of the truck is 25 in. It is stated that with this new type of truck one man can easily pick up and transport loads up to 900 lb., the design being particularly adapted for operation in restricted spaces.

Brown & Sharpe Cam Lock Arbor

The tool shown in the illustration is a cam lock arbor which has been brought out by Brown & Sharpe Mfg.



**Let ME
handle
your tough
tapping
jobs**

**BATH TAPS can handle
tough tapping jobs be-
cause they're ground
from the solid after
hardening . . .**

BATH TAPS are tough all the way through — from core to
teeth — the same perfect hardness.

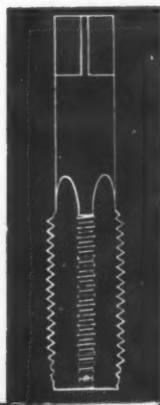
Because these teeth are not dulled by heating, they stay sharp
longer, cut more accurately and allow more tapped holes per tap.

For you this means lower costs, greater accuracy, and higher
production — in a word, *greater profits.*

Put BATH TAPS on your tapping jobs — especially the tough ones.

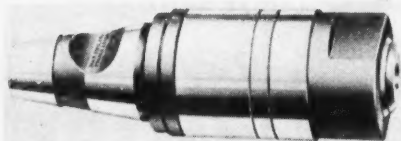
JOHN BATH & CO., Inc.

WORCESTER, MASS.



IT PAYS TO BUY BATH "Ground From The Solid" TAPS

Co., Providence, R. I., for use with cutter adapters and milling attachment spindles with a cam lock. This arbor makes it possible to use certain small milling and other cutters with cam lock adapters, providing for them all the ad-



Brown & Sharpe Cam Lock Arbor

vantages of positive drive and quick cutter change of the patented Brown & Sharpe Cam Lock Cutter Adapters.

The arbor is made in two sizes; No. 30-7/8D-2 and No. 31D-2, diameters of which are $\frac{3}{8}$ and 1 in. respectively. The length from shoulder to nut is 2 inches.

"Majestic" Metalayer

The "Majestic" Metalayer recently developed by the Metals Coating Company of America, 497 N. Third St., Philadel-

phia, Pa., will deposit approximately 10 per cent more metal over a given time with approximately one-third less oxygen and acetylene consumptions per weight of metal deposited in larger size wire than previous models of this equipment. The mechanical problem of feeding heavier wires, at greater speeds, required a new departure in the method of gearing and increased bearings throughout without the introduction of excessive weight or unwieldy size.

With the efficient design of the turbine, a small increase only in the pressure and volume of compressed air is required over tools of lower capacity. The train of gearing from the turbine to the final feed roll consists of two hardened worms, one bronze and one fibre gear, respectively, of special composition, and the entire gear assembly is enclosed in one compartment containing grease, insuring perfect lubrication. Wearing parts have been reduced to a minimum and any changes or repairs necessary can be readily effected.

The feed rolls are conveniently engaged by an adjustable latch bolt operated with a single motion, facilitating speedy engagement, sensitive control and quick release. The gun can be lit and flames adjusted with or without the wire feeding, thus eliminating the waste

NEW

U. S. No. 1 Anti-Friction Bearing Hand Milling Machine

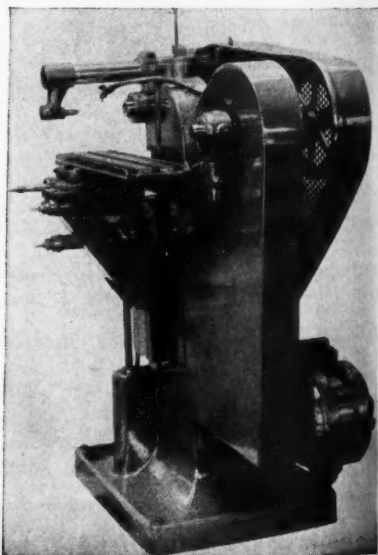
The New U. S. Hand Miller is particularly adapted to high speed light milling operations. Vertical and horizontal feeds.

Improvements: Heat treated chrome nickel steel spindle, Timken bearings, Ballbearing countershaft, V-belt drives, 6 Spindle Speeds up to 1592 R.P.M., providing efficient use of small end mills.

Write for full details.

The UNITED STATES MACHINE TOOL Co.

1954 W. 6th St. Cincinnati, Ohio



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Pilot Cy

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FOR

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C.B. H

DISTIN

NEW!

SOLID STEEL SLAB

Q. A. W. HYDRAULIC CONTROL VALVES

2-WAY — 3-WAY — 4-WAY
1/2", 3/4", 1", 1 1/4", 1 1/2", and 2"



TWO TYPES

Hand Lever or Pilot Cylinder Operation

For 1000 Pounds Working Pressure
For 2000 Pounds Working Pressure

Sizes including 1" available in heavy bronze forged housing recommended for water and corrosive fluids. All sizes available with housing machined from solid steel slab recommended for oil or soluble oil solutions. As one user says—"These Hydraulic Valves can take it."

Quick-As-Wink
Control VALVES
FOR AIR FOR WATER

C.B. HUNT & SON - SALEM, OHIO
DISTRIBUTORS IN PRINCIPAL CITIES



NO METAL-TO-METAL CONTACT

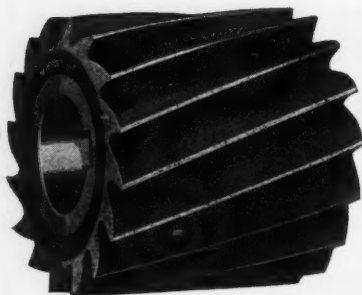
Built on the Q.A.W. principle of No Metal-to-Metal wear in the valving action, Chrome Nickel plungers, short travel, and balanced action, these new valves offer extremely long life in hard service. Inspection and re-assembly in a few minutes.



Write for complete new catalog of Air and Hydraulic Valves, "4 M" (key)

Midwest Cutters

for every kind of cut

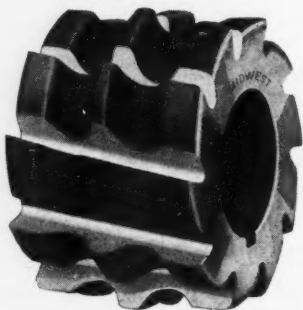


CORRECTLY designed to cut freely, eliminate chatter, and provide ample chip clearance. Made from carefully selected steel and expertly heat-treated to take maximum number of cuts between grinds at high speed.

Send for Catalog No. 14-M showing complete line of Midwest standard and special Milling Cutters and End-Cutting Tools.

Midwest Tool & Mfg. Co.

2358 W. Jefferson Ave.
Detroit, Mich.

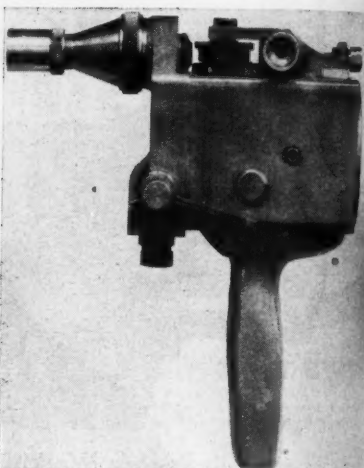


**Midwest Special Form Milling
Cutters Engineered to Your Job**

of wire during adjustment. No moving parts are exposed.

The "Majestic" is well balanced and the final adjustment and control of oxygen, acetylene and compressed air is made with one movement of the valve handle. Oxygen, acetylene and air connections are readily replaced and the standard prevailing within the oxacetylene industry. The tool can be supplied with a standard handle for manual operation or adjustable tool post holder for mechanical operation.

The best practice employed in the

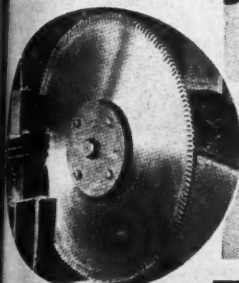


"Majestic" Metalayer

oxacetylene industry for efficient mixing and safe handling of the oxygen and acetylene has been incorporated in the mixing device in this tool, assuring safe operation with an ample supply of oxygen and acetylene available at a pressure below 15 lbs. per square inch in accordance with the Underwriters Rulings. Notwithstanding the increased rate of wire melted and atomized, the final deposit approximates the fine grain obtained with tools of smaller capacity. The "Majestic" operates with compressed air at 55 to 70 lbs. per square inch depending upon the metal and size of wire, and with oxygen and acetylene at from 8 to 15 lbs. per square inch depending upon the metal and size of wire. Any medium pressure type acetylene generator of an approved design can be employed for the source of acetylene supply.

moving

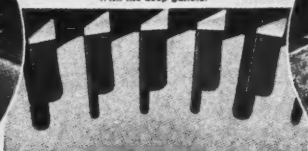
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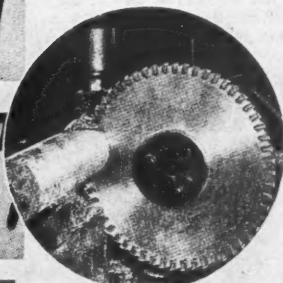
Basic Sectional Interlock Inserted-Tooth
Saw. For cutting steel rails, irregular shapes,
any iron steel castings, and all work
that requires close tooth spacing.



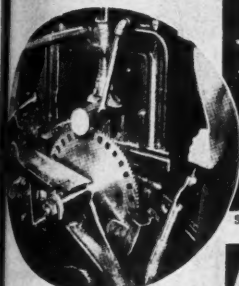
Disston Improved Interlock Inserted-Tooth.
With the deep gullets.



Disston Sectional Interlock Inserted-Tooth.



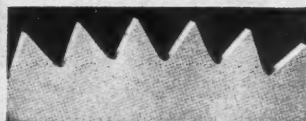
Disston Improved Interlock Inserted-Tooth
Saw. For cutting large, heavy forgings, cast-
ings, rounds or squares, and all work that
does not require close tooth spacing.



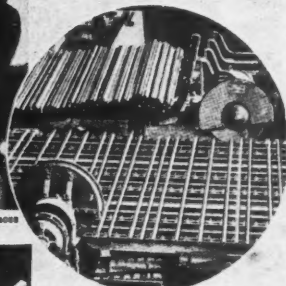
Basic Solid-Tooth Metal-Cutting Circular
Saw. For all purposes and machines. High-
speed steel, semi high-speed, high-carbon,
and steel for cutting brass, type metal, etc.



Superiority of Cutting Steels from Disston Furnaces
Today Typifies America's Industrial Progress.



Disston Hot Saws designed for high-speed saw-
ing of hot metals. Teeth milled, not punched.
Hollow ground for accuracy.



Disston Tube-Cutting Circular Saws. Made
with or without expansion slots. Accurately
ground and balanced. Correctly tensioned.
Noted for high-speed operation and efficiency.

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Cut It with Disston Steel

Disston steel was originated as *cutting steel*! It is steel famous for its part in the building of America... steel distinguished for service rendered in American industrial progress. So, today, Disston steel in saws, tools, files, marches ahead—meeting industry's needs on every cutting job.

All Disston experience, laboratory re-

search, experiment, is yours to use. Write us what you cut. Let us co-operate with you, to improve production and cut costs. Henry Disston & Sons, Inc., 921 Tacony, Philadelphia, U. S. A. Branches: Boston, Chicago, Detroit, Memphis, New Orleans, Seattle, Portland, Ore., San Francisco, Vancouver, B. C. Canadian Factory: Toronto.

DISSTON METAL-CUTTING Circular Saws

Write: Metal-Cutting Manuals: "Circular Saws", "Band Saws", "Hack Saws", "Files". Write address below, clip and mail to Disston, 921 Tacony, Philadelphia, U. S. A.

Air-O-Chek Air Valve

An air valve the design of which is a radical departure, both in principle and manner of operation, from the conventional type of hand-operated air pressure valve is found in the "Air-O-Chek" All-Purpose Air Valve now being marketed by Air-Way Pump & Equipment Co., 623 W. Jackson Blvd., Chicago, Illinois.

The valve, illustrated herewith, is sturdy and simple, yet mechanically highly efficient. All operating parts are shielded within the valve and air hose. There are no protruding buttons or external control levers of any kind, and no packing glands. The ball and socket joint with actuating trigger stem is a mechanical feature said to be found only



Air-O-Chek All-Purpose Air Valve

in the Air-O-Chek. All internal parts are free floating and may be removed for servicing simply by unscrewing the threaded nozzle head.

The Air-O-Chek is made of solid bar stock throughout, brass and stainless steel, and is built to precision standards. The valve is always ready for use. It requires only a slight pressure of the



View Showing Operating Mechanism

thumb and hand at the head of the valve to flex the hose for instant release and control of air, in any volume and velocity. Positive shut-off is effected instantly by releasing the hand pressure or dropping the hose.

The Air-O-Chek Valve is available with Tip No. N1 in $\frac{1}{4}$, $\frac{3}{8}$ and $\frac{1}{2}$ -in. sizes. Extension tips, also available, are $\frac{1}{4}$ -in. flat, $\frac{1}{4} \times 3$ in., $\frac{1}{4} \times 4$ in., $\frac{1}{4} \times 5$ in. and $\frac{1}{4} \times 10$ inches.

"Tantaloy" Hard-Cutting Alloy

"Tantaloy" is the trade mark of a new hard cutting tool and wear resisting alloy developed by Fansteel Metallurgical Corporation, North Chicago, Illinois. It

-Grinds 81 SIZES OF Drills

No. 31 to $\frac{1}{2}$ "

This Star Precision Grinder puts drill grinding on a production basis. Its simplicity and accuracy saves as high as 50% on drill costs and insures uniform accuracy that guarantees perfect holes and increases production.



Write for descriptive folder.

STAR MACHINE & ENGINEERING CORP.

Division of Star Electric Motor Co.

BLOOMFIELD AVE.

BLOOMFIELD, NEW JERSEY

November

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WHY SHOULD SKILLED MACHINISTS BE LOAD-LIFTERS?

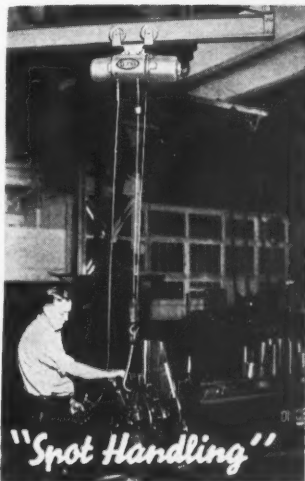


— WHEN THE ZIP-LIFT IS HERE TO SAVE TIME, EFFORT AND MONEY!

The Zip-Lift is a small electric hoist designed especially for use in machine shops, etc. It costs but a little, pays for itself in a short time by relieving trained operators of fatigue—by keeping machine tools busier . . . by getting more production out of your present equipment. Mounted on a hook, jib or trolley, this new machine tool accessory makes old-fashioned chain blocks obsolete.

USE THE COUPON BELOW FOR FULL INFORMATION

Learn how the Zip-Lift is saving money in hundreds of machine shops. Take advantage now of the economies it makes possible for you. Ask us to send you a copy of Bulletin H-2. Address the Harnischfeger Corporation, 4535 West National Avenue, Milwaukee, Wisconsin.



The ZIP-LIFT stops waste with "Spot Handling"

HARNISCHFEGER CORPORATION

HOISTS • WELDING ELECTRODES • MOTORS  EXCAVATORS • ELECTRIC CRANES • ARC WELDERS

HARNISCHFEGER CORPORATION
4535 West National Avenue, Milwaukee, Wisconsin

Please send, without obligation, a copy of Bulletin H-2 which explains money saving with the Zip-Lift.

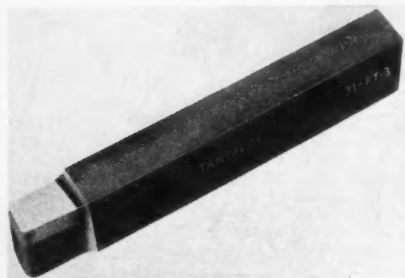
Name

Company Address

City State

is a general purpose hard metal ordinarily used as a tip which is brazed to a steel shank to form a cutting tool.

Containing tantalum carbide, Tantaloy possesses the characteristics of a high



Tantaloy, a tantalum carbide alloy of unusual toughness, is brazed to steel shanks, making cutting tools of high durability for severe service such as interrupted cuts, heavy feeds, and varying hardness of metal.

degree of chip slippage which resists the development of crater by the chip action. When regrinding, Tantaloy tools require very little metal removal, thus decreasing the grinding time and in-

creasing the useful life of the tool. An outstanding characteristic is toughness, making Tantaloy-tipped tools highly efficient for service ordinarily regarded as severe, such as interrupted cuts, heavy feeds, varying hardness of metal, or tool mounting essentially deficient in rigidity.

Tantaloy-tipped tools are available in all standard lathe, boring mill and turret tool sizes and the metal is also available in tips which may be brazed to boring bars, counter bores, or special tools. Tantaloy is recommended for gages, lathe centers, centerless grinder rests, wearing surfaces, and the general field of application of abrasion and corrosion resisting metal.

Finnell 82-X and 84-X Electric Floor Cleaning Machines

Heavy accumulations of dirt, oil, grease, metal shavings, and so on, can be removed from floors of wood, wood blocks or cement in industrial plants by the use of the 82-X or 84-X Electric Floor Cleaning Machines which have been placed on the market by Finnell System, Inc., 999 East St., Elkhart, Ind. Water or solvents are not required in connection with these machines in order

IT'S PRECISION BUILT the C-O 21" Sliding Head Drill

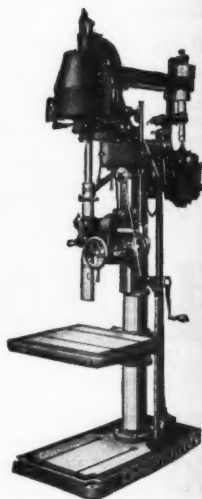
Here's a typically accurate, flexible, yet larger C-O Drilling Unit for high production drilling of large holes. Self-feed and back gear attachments provide a wide range of speeds and feeds.

Vertical Motor Drive—eliminates unnecessary pulleys, idlers, twist and turn belts, reducing wear and vibration; cone pulleys are dynamically balanced, a flexible coupling inserted removes vibration in the drive shaft. Two Timken Roller Bearings in the Spindle Quill at the top and bottom, provided with a screw adjusting collar for take up. Annular ball bearing in the motor cone pulley, and ball bearing motors. Positive type power feed is controlled by a push knob.

Canedy-Otto Drills, are always "Ready For The Job".

Write for illustrated circular giving complete details.

CANEDY-OTTO MFG. CO.
CHICAGO HEIGHTS ILLINOIS



The SENSATIONAL



INSERT CHASER DIE HEADS

bring you

1—LOWER THREADING COSTS

The very low price of H&G Insert Chasers, together with the most extraordinary wearing qualities, result in much lower chaser costs per thousand pieces.

2—SIMPLIFIED THREAD CUTTING

The very simplicity of this tool in which worn chasers may be replaced by new with only a few minutes of lost production time and eliminating the necessity of making adjustments, naturally results in higher net production.

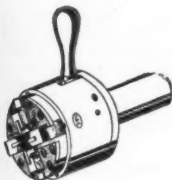
The regrounding of chasers is no longer a problem.

Write for literature.

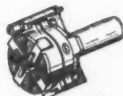
THE EASTERN MACHINE SCREW CORPORATION

38-58 Barclay St.

New Haven, Conn.



STYLE MS
for hand turret machines



STYLE DM
for B&S Automatics and other single spindles



STYLE MM
for rotary spindles



STYLE IMM
is equipped with improved internal trip for shoulder threading such as for spark plugs



STYLE TM
has receding chasers for cutting superior quality taper threads.

Thor Stamps

GIVE

Better Marks

for a Longer Time



You get clear, legible markings for a longer period of time when you use Thor Stamps.

Thor Stamps have "blue heads"—signs that the special alloy steel is correctly heat-treated.

Turned Heads — give a central striking point. Thumb Side Marking—makes them easily read, easily used.

Buy stamps for the marks they make—buy Thor Stamps—better marks and more marks.

Send for booklet.

The Pittsburgh Stamp Co.
812 CANAL ST. PITTSBURGH, PA.

to remove accumulations of grease or dirt.

The machine consists primarily of a heavy duty electric motor transmitting power through worm gears of special bronze to two brushes which rotate in a horizontal plane. Two wire scarifying brushes are employed, set into brush rings which are interchangeable. The rotating parts of the mechanism operate



Finnell Electric Floor Cleaning Machine

in oversize Timken roller bearings and the worm gears, together with a hardened, ground and polished nickel steel worm, are housed in a leak-proof gear case. The two brushes rotate toward the center of the machine, producing balanced operation even under extreme conditions.

The brushes are available in five standard sizes of steel wire to suit various floor sizes conditions. Each is refillable when worn, the plates being returned to the manufacturer for this purpose. Tampico or Palmetto fibre brushes can be used in addition to the wire brushes if desired.



BECAUSE we have over one million gears in stock we are able to

ship 95% of our stock orders within twenty-four hours.

Simplify your delivery problem — Specify Boston Stock Gears.

Our General Catalog #51 contains complete specifications and

list prices of all Boston Stock Gears. Write today for your copy.



BOSTON
GEAR WORKS, INC.

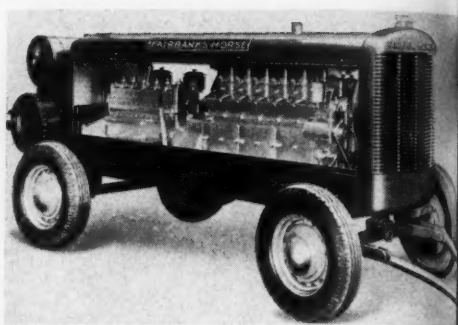
NORTH QUINCY, MASSACHUSETTS

Brushes of 11-in. diameter are used, the total brush spread being 22 in. on each machine. A 1 h. p. General Electric motor is used on the No. 84-X machine, the No. 82-X machine employing a $\frac{3}{4}$ h. p. motor. Fifty feet of 14 gauge two-conduit rubber-covered cable is supplied with each machine.

Fairbanks-Morse 210-c.f.m. Diesel-Powered Air Compressor

Fairbanks, Morse & Co., 910 S. Wabash Ave., Chicago, Ill., has announced a new self-contained, Diesel-powered, 210-c.f.m. air compressor, available with several types of portable and semi-portable mountings, for a wide range of service applications. This new compressor combines the economy and dependability of the F-M Model 36-A Diesel with the superior design features of a proved air compressor, making available a compact, lightweight unit that offers maximum efficiency and absolute reliability under all working conditions.

Through the proper application of modern principles of engineering design,



Fairbanks-Morse Diesel-Powered 210-c.f.m. Air Compressor with Pneumatic-Tired, Four-Wheel Portable Mounting

the compressor unit has been kept light in weight and small in size, contributing to its portability. Ample bearing surfaces and proper lubrication make possible a long trouble-free life. The water cooling system assures thorough and uniform cooling in any climate and under any condition. Low upkeep expense results from the employment of refinements of proved automotive engine design.



12" DISC GRINDER

for grinding small parts
1/3 H.P. BALL BEARING MOTOR
1750 R.P.M.

A.C. 110 volt, 60 cycle, single phase.
8"x10" table mounted on swivel sockets
adjustable to 50° in any direction.

\$32.50

F.O.B. New York City
(without wire buffer)

● Here's a Disc Grinder that was specially designed to save you time and money on small part grinding — wood patterns, small metal castings, glass edges, etc. Write for further details.

CHELSEA FAN & BLOWER CO., Inc.
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IF IT'S A

Jacobs

IT HOLDS!

SUPER



The ability to function unfailingly under all conditions is the nearest approach to perfection . . . Try Jacobs Ball Bearing Super Chucks.

THE JACOBS MANUFACTURING COMPANY
HARTFORD CONNECTICUT, U. S. A.

The compressor is designed to operate at full engine speed, permitting direct-connection to the engine without reduction gears or belts and without sacrificing engine horsepower through reducing the rated speed.

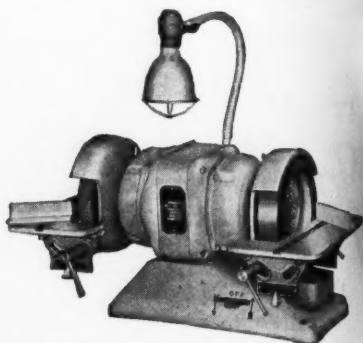
The F-M Model 36-A, four-cycle, six-cylinder, medium-high speed Diesel engine offers true Diesel economy with necessary flexibility. Its compact, clean-cut appearance is outward indication of inbuilt sturdiness to withstand hard usage. Reliability results from simplicity of design with few moving parts, absence of delicate mechanisms, and the use of simple adjustments where any are required. Durability is obtained by the generous proportioning of parts in stress and use of only highest grade materials. The engine is designed to permit easy inspection and servicing.

The new Fairbanks-Morse Diesel-powered air compressor is available with several types of mounting: wooden skid, steel wheel, solid or pneumatic rubber tired wheel, four- or two-wheeled trailer, and motor or railway truck.

Baldor Grinder for Carbide Tools

The Baldor Electric Company, 4380 Duncan Ave., St. Louis, Mo., announces

the development of a grinder, designed for the one purpose of sharpening carbide tools. This grinder is equipped with two wheels, one for roughing oper-

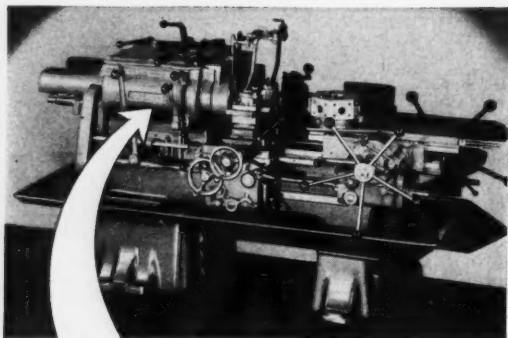


Baldor Grinder for Carbide Tools

ations and one for finishing operations, and is powered with a $\frac{1}{2}$ h.p. reversible motor so that either right hand or left hand tools may be sharpened with the wheel always rotating towards the cutting edge of the tool. The grinder is

PULLMORE CLUTCHES

In Gisholt Turret Lathes



Two single-type Pullmore Clutches, running in oil, are used in the spindle drive of Gisholt Universal Ram Type Turret Lathes for changing from high spindle-speed range to low, or low range to high, instantly without shifting gears or stopping the spindle. Pullmore Clutches are used also in the carriage of Gisholt Heavy-Duty Turret Lathes.

Pullmore Clutches are used because they operate easily, pick up and release loads quickly and smoothly; stand up in continuous service. They are reliable, compact, durable; meet the design and service requirements of automatic and semi-automatic industrial machinery. Pullmore Clutches are made in single and double types, for operation in oil or dry, in many sizes for transmitting up to 75 h.p. Investigate. Write today for complete information. Ask for the Pullmore Blue Book.



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Borg-Warner Corporation, 300 Catherine Street, Rockford, Illinois
Sold by MORSE CHAIN CO., Ithaca, N. Y. With offices in principal cities

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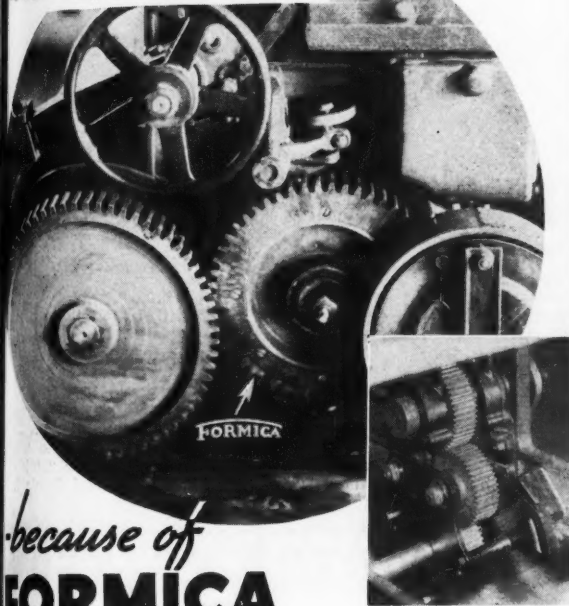
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Thousands of Machines are **QUIETER**



because of **FORMICA**

any of the machines whose operation has been made
quiter and more efficient are large and heavy, and a
many of them are lighter apparatus used in homes
stores where quiet operation is a consideration of
the first importance.

Formica makes machines easier to sell. It also helps the
maintenance man to keep machines running smoothly
and sweetly. For these reasons the use of the material
has been growing, and more and more is being used.
Write for our booklet of data on Formica gears.

THE FORMICA INSULATION CO.
40 Spring Grove Ave. Cincinnati, Ohio



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- The Master Electric Co.
Dayton, O.
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Hartford, Conn.
- Besty Machine Works
Keokuk, Ia.
- The Generating Gear Co.
Milwaukee, Wis.
- Badger State Gear Co.
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Minneapolis, Minn.
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Supply Co., Pittsburgh, Pa.
- Perkins Machine & Gear Co.
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- Arlington Machine Co.
St. Paul, Minn.
- Farwell Mfg. Co.
Toledo, Ohio
- Diefendorf Gear Corp.
Syracuse, N. Y.
- Batson Cook Co.
West Point, Ga.
- Worcester Gear Works
Worcester, Mass.
- Massachusetts Gear & Tool
Co., Woburn, Mass.

designed to take a silicon cup wheel on the left hand side and either a silicon cup wheel or a diamond cup wheel on the right hand side.

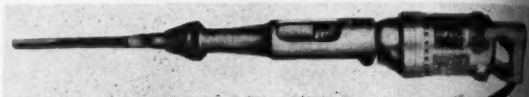
Standard equipment includes the following items: tool rest tables 10x3½ in.; protractor at each end of the grinder to indicate the angle of the tool table; light which may be swung over either wheel; tool supports attached to the tool rest table. Wheels are optional.

Wodack "Do-All" Combination Electric Hammer and Drill

With the "Do-All" Combination Electric Hammer and Drill shown in the illustration, holes can be drilled in concrete, brick, and stone as well as in metal and other substances. The tool is made by Wodack Electric Tool Corporation, 4627 West Huron St., Chicago, Ill., and is especially adapted for maintenance work in the factory and similar uses.

The start drill used in drilling concrete or stone is not held as tightly in the manner as a twist drill is held in

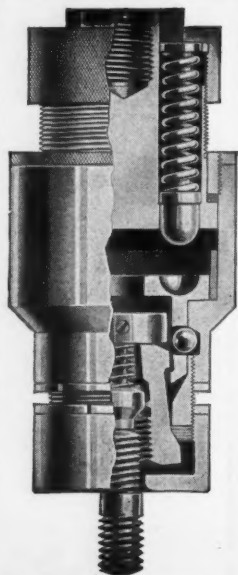
a chuck, but fits loosely in the socket so that the blows delivered by the hammer can rebound in the same manner as blows delivered by a hand hammer. This method of holding the start drill



Wodack "Do-All" Combination Electric Drill and Hammer

has advantages, the only disadvantage being that the drill can be dropped out of the hammer or inadvertently shot out, with the possibility of hitting a person or breakable object. The disadvantages referred to has, however, been eliminated in this drill by the use of a retainer.

The retainer is made entirely of molded rubber and fits over the nose of the hammer in such manner as to hold the drill in place with just the right amount of play for rapid drilling or cutting. It also prevents grit from getting into the socket in overhead drilling. The retainer is standard equipment on all Wodack electric hammers.



TITAN STUD SETTER CONTROLLED DRIVE Assures Perfect Setting

The Titan Stud Setter has a safety clutch which controls driving power.

The Titan is positive in driving and automatic in releasing, thus making it possible to set the studs to any predetermined degree of tightness.

When the studs are driven to the specified tightness, the drive is automatically released and the tool may be removed without fear of mutilating or distorting the threads.

The great capacity, speed range, utility, and safety of this production tool make the Titan Stud Setter a profit-earning tool wherever it is used.

Write today for the new illustrated circular.

TITAN TOOL COMPANY

FAIRVIEW

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THERE'S ONLY ONE YOU CAN SELL ME— THE PRECISION SET

DANLY DIE SETS AND DIE MAKERS' SUPPLIES

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● Those firms that use stampings to the point that they are major items in cost, long ago learned the value of the Danly Precision Die Set.

They know that precision pays, in the freedom from shearing, less regrinding and, above all, insurance against die destruction and production line tie-ups.

Precision Pays—make sure you get it by specifying Danly Precision Sets for mounting all your dies.

DANLY MACHINE SPECIALTIES, Inc., 2122 So. 52nd Ave., Chicago, Ill.

DANLY PRECISION DIE SETS

MARKING

**FLAT—ROUND
IRREGULAR SURFACES
BY ROLLING
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MODEL 25

HI-DUTY MARKING MACHINE

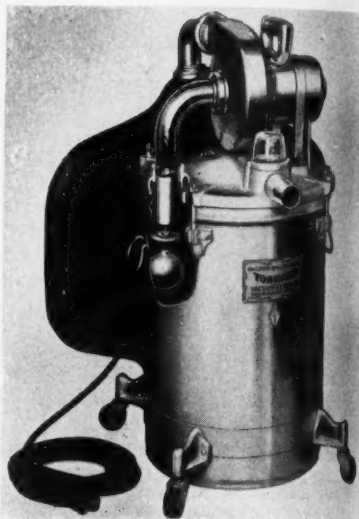
This machine operates from your plant air line, and is one of numerous models built to produce fast, neat marking on metal parts. Hi-Duty marking machines may be had for practically any marking operation, and we will be glad to make recommendations upon receipt of your inquiries. Send prints or samples of parts to be marked, showing lettering and location, also state required production.

GEO. T. SCHMIDT, Inc.

1806 BELLE PLAINE AVE.
CHICAGO, ILL.

Tornado Industrial Vacuum Cleaner

The Breuer Electric Manufacturing Company, 843 Blackhawk St., Chicago, Ill., announces important improvements in its line of portable Heavy Duty Industrial Vacuum Cleaners and also Tornado Portable Electric Blowers for re-



Tornado Industrial Vacuum Cleaner

moving dust and dirt from motors, machinery and industrial plants and processes.

The Tornado Portable Cleaner, Model 112, is now furnished with a new double size dust bag.

Tornado Blowers, Model 6A and 8A, are now built with enclosed ball bearing assembly and screen gauge over the end of motor housing to prevent excessive dust and dirt from getting into the motors.

Interval Gas-Fired Steel Treating Furnace

The Interval furnace for heating steel for hardening, now being marketed by Bennett Insured Steel Treating Company, South St., Newark, N. J., embodies a single chamber with a cylindrical oval interior so constructed that heated products of combustion can not contact the piece in process. The Interval furnace is 32 in. high and 20 in. in diameter



**SAVE
\$100 TO
\$300**

MONTHLY WITH THIS LINCOLN WELDER

You are *bound* to profit by changing over to electric welding with a new Lincoln Machine Shop Welder because:

ONE—You can weld twice as fast as with the old process.

TWO—Your welding materials cost one-fourth as much.

THREE—You can fabricate, repair and hard-face more jobs successfully, resulting in savings that can pay for the welder in little time.

Machine shops report savings of \$100 to \$300 monthly with this powerful, motor-generator type arc welder. Mail the coupon for details.

THE LINCOLN ELECTRIC CO.

Largest Manufacturers of Arc Welding Equipment in the World

MAIL THIS COUPON TODAY

**THE LINCOLN ELECTRIC CO.
Dept. E-443, Cleveland, Ohio**

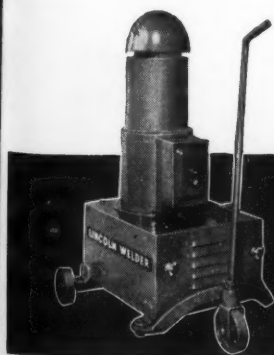
Send a free copy of Bulletin 314 and easy payment details on the Lincoln Machine Shop Welder.

Name Position

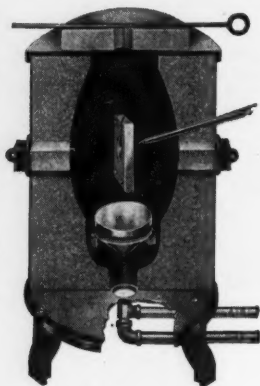
Company

Address

City State



outside. The heating chamber is 14 in. high by 9 in. wide at the center and 7 in. wide at the top. The entire furnace



Interval Gas-Fired Steel Treating Furnace

weighs 550 lbs. and is shipped complete with burner.

To heat work in the Interval furnace, the pieces are suspended in the furnace

by means of an attached wire and are heated entirely by radiation. A deflector at the base of the heating chamber, against which the heat is impinged, permits heated products of combustion to flow upward in close proximity with the concave walls to finally be released at the upper opening. Due to this method of firing, products of combustion pass upward and parallel to the interior side walls, having, as a consequence, a minimum of effect upon the furnace walls and reducing upkeep cost to the minimum.

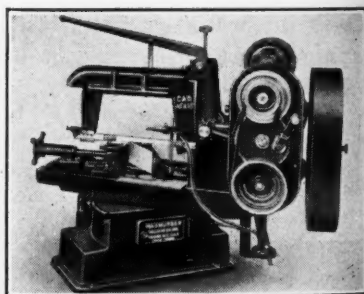
The cone-shaped brick or deflector at the lower part of the furnace is supported by three silicon carbide inserts. The super-imposed brick is provided with small standards to allow an air space between the two. The Interval is preferably gas-fired and will reach and maintain high speed temperature in remarkably short time and small expense, regardless of the fuel employed. The internal construction of the furnace is such that tools of straight carbon steel, Hi-Carbon Hi-Chrome and high speed steel may be heated from minimum to maximum temperatures without danger of loss in size, pitting or oxidation.

The pyrometer opening in the Interval furnace is so situated that the fire

THE NEWEST DEVELOPMENT IN METAL SAWING MACHINES

CAPACITY $\frac{6'' \times 6''}{10'' \times 10''}$

Swivels on base for angular cuts—three speeds by V-belt—saw guide of parallel type—saw frame has 4 large, self-aligning shoes, unaffected by excessive tightening of saw blade—vise graduated to 45°—feed is compensating type.



Also built as **FULL AUTOMATIC**. Send for circulars giving complete information.

RASMUSSEN MACHINE CO. RACINE, WIS.

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REAMERS AND END MILLS



ORIGINATORS of the
Helical Taper Pin Reamer
Special Reaming Problems Invited
Immediate Shipment on Stock
Tools

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THE GAMMONS-HOLMAN CO.

MANCHESTER, CONN.

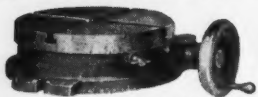
end of the pyrometer can be located at close proximity to the piece being heated, resulting in correct optical comparison. Two 5x3-in. openings are also provided directly in line on two sides of the furnace so that end mills, nut taps, reamers and similar tools may be heated at the ends only, leaving the shanks in the original soft state. The openings are closed with refractory plugs when not in use. A pure cast nickel plate 22 in. long by 5 in. wide is furnished which, when both refractory plugs have been removed, can be placed through the openings so that small pieces can be

inserted through the front and forced through the rear into the cooling medium.

The Interval furnace may immediately be converted into a lead, cyanide or salt bath furnace by removing the two top bricks and one of the side plugs, leaving an opening which acts as a flue. A pressed steel pot 6 in. in diameter and 12 in. deep may be used for this purpose.

If desired, pyrometer equipment with rare metal fire ends and protecting tubes can be supplied, also electrified blower equipment mounted on a compact single base.

OHIO CIRCULAR TABLE



NEW!

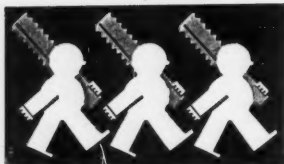
... for Milling Machines, Slotters, Die Sinks, Shapers—12" and 15". A high grade table at a low price.

Dealers write for attractive proposition.

ALFRED A. TROYKE

219 E. Second St., Cincinnati, Ohio

IN STEP WITH METAL CUTTING PROGRESS



Precision-made taps in a wide variety of styles, in **CARBON ALLOY** and **HIGH SPEED STEEL**, for economical thread cutting.

THE WINTER BROTHERS CO.

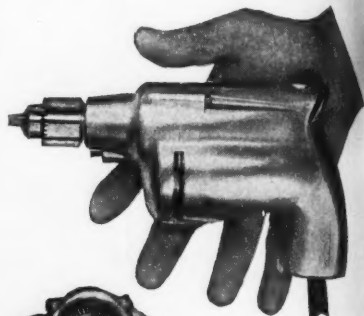
Wrentham, Mass.

• Detroit, Mich.

Division of the National Twist Drill & Tool Co., Detroit, Mich.

Millers Falls "Dyna-Mite"

The illustration shows the "Dyna-Mite"—a streamlined $\frac{1}{4}$ -in. production



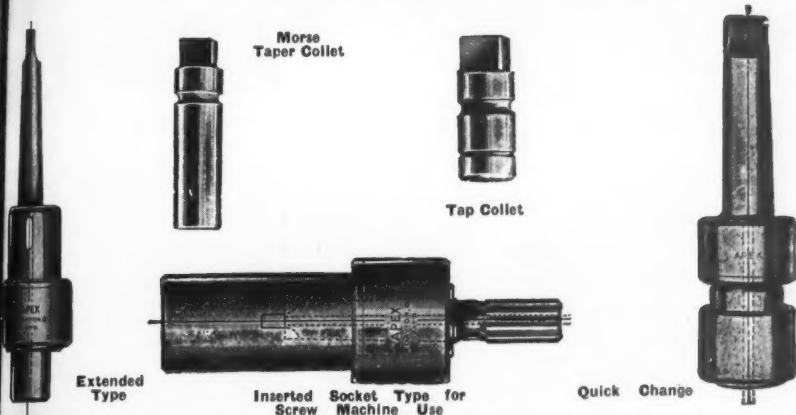
Millers Falls "Dyna-Mite"

drill which has been developed by Millers Falls Company, Greenfield, Mass. The features of the tool are its streamlined body, its extreme light weight of only $2\frac{1}{2}$ lbs., overall length of only 8 in., width of body of $2\frac{1}{2}$ in., and the ease with which it is controlled with one hand. Strictly a production tool, the Dyna-Mite will drill $\frac{1}{4}$ -in. holes in

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FLOATING TOOL HOLDERS MEET MODERN PRODUCTION NEEDS



These tools compensate for machine spindle misalignment. Apex Floating Holders are designed to permit tools to follow holes on a true line regardless of irregularities in alignment of machine spindle and work. Taps produce threads with uniform pitch diameters. Reamers finish holes true to size.

Sockets are furnished for Morse Taper or straight shank tools. Shanks are furnished in any taper or straight diameters to fit any size or style of machine spindle, or with adapter shanks to General Motors or Chrysler Motor standards.

Apex Floating Holders are also furnished with quick change chucks so that collets for Morse Taper or straight shank tools and collets for taps may be quickly changed.

APEX

cost reducing
PRODUCTION
● **TOOLS** ●

The Apex Machine & Tool Co.

Third & Madison Sts. Dayton, Ohio

CLIP . . . MAIL TODAY

The Apex Machine & Tool Co.
557 East Third Street, Dayton, Ohio

Name _____ Street _____

City _____ State _____

APEX TOOLS: _____ Quick Change Drill Chucks. _____ Morse Taper and Tap Collets. _____ Close Center Chucks. _____ Positive Drive Chucks. _____ Vertical Float Tapping Chucks. _____ Safety Friction Tapping Chucks. _____ Full Floating Tool Holders. _____ Semi-Floating Tool Holders. _____ Floating Tap Sleeves. _____ Self Releasing Stud Setters. _____ Universal Joints. _____ Universal Joint Socket Wrenches. _____ Screw Drivers. _____ Adjustable Blade Hand and Machine Reamers. _____ Power Bits and Hand Drivers for Phillips Recessed Head Screws. _____ Power Bits for Slotted Head Screws.

steel continuously at a speed which is said to tax the staying powers of any operator. Its size and weight give perfect hand control with a minimum of fatigue. The small girth and streamlined shape permit its use in extremely close quarters.

The die cast aluminum shell houses a powerful motor with a ball bearing armature running in a horseshoe field. The driving mechanism comprises a train of quiet, powerful helical gears made from heat treated chrome molybdenum steel. The spindle runs in over-size oilite bearing and thrust is taken by a ball thrust bearing. A copious flow of air insures cool operating temperatures. Control is through a double pole fully-enclosed switch.

The no-load speed is 1600 r.p.m. and the full-loaded speed is 875 r.p.m. 1.8 amperes are consumed under full load. The motor is universal for D.C. or A.C., up to 60 cycles and either 110 or 220 volts.

Ohio Circular Table

The circular table shown in the illustration, designed for use with milling machines, slotters, die sinkers, shapers and similar machine tools, has been placed on the market by Alfred A.

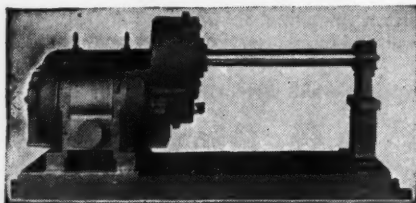
Troyke, 28 W. Second St., Cincinnati, Ohio. The tool is made in two sizes 12 in. and 15 in., these sizes representing the turntable diameter. The overall height is 4 in., the hole in the center is 1½ in. in diameter and the tongue strips are ⅝ inch.

The turntable rests on a wide flat



Ohio Circular Table

bearing 11½ in. in diameter. A large thrust collar holds the table down and provides means for taking up wear. It revolves on a center stem running in an adjustable tapered bushing. The table is graduated in degrees and an adjustable pointer is provided for setting. The worm wheel is of ample size and means are provided to take up wear between the worm and wheel. The turntable is revolved by means of an aluminum alloy hand wheel, one revolution of which moves the turntable four degrees. A lock is provided to hold the table stationary for straight milling.



CONE PULLEY DRIVES

● These drives make your machines independent of line shaft location or operation. They often increase production as much as 50%. The 3 bearing drive shown above is the basis of all of our designs. It can be furnished for floor mounting, or, with our supports, for mounting directly on lathes, screw machines, shapers, millers, and other tools. Furnished with heavy duty anti-friction bearings thruout, it maintains accurate alignment and delivers a smooth flow of power under all operating conditions.

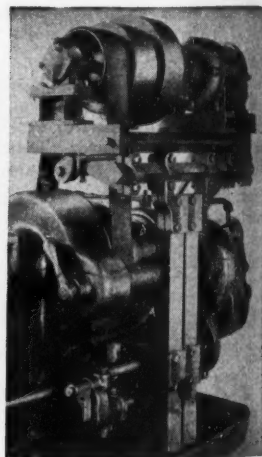
Easily installed.

Reasonably priced.

THE PRODUCTION EQUIPMENT CO.

5219 Chester

Cleveland, Ohio



REAR VIEW OF SCREW MACHINE DRIVE

The NEW Hisey

HISEY Wet Grinders are made as follows:—

- Two Wheel Wet Grinders
- One Wheel Wet Grinders
- Combination Wet and Dry



Consider these *Practical Advantages* of Hisey Grinders

- Constant stream (adjustable) of coolant directly on the work.
- Elimination of dust collecting system.
- Self Priming Pump.
- Reservoir of generous capacity.
- V Belt drive to spindle and pump.
- Universal adjustment of nozzle.
- Large flushing plate.
- Ball bearing spindle sealed against water and dirt.
- Corrosion resistant.

Literature on request.

HISEY Wet Grinders are made in various types and sizes for 10, 12, 14, 16, 18, 20 and 24 inch diameter grinding wheels. Sixteen inch machines and larger are made in single wheel type only. Smaller machines are made in single wheel, two wheel and combination wet and dry types. Pump is self priming and bearings are never under water. Same motor drives pump and grinding wheels thru V belts. Machines can be furnished with or without motor, as any available motor may be used. Wet Grinders eliminate the necessity of a dust collecting system as required by many States as the water carries with it all dust and grit.

THE HISEY-WOLF MACHINE CO.

"It's High Grade
If Hisey Made"

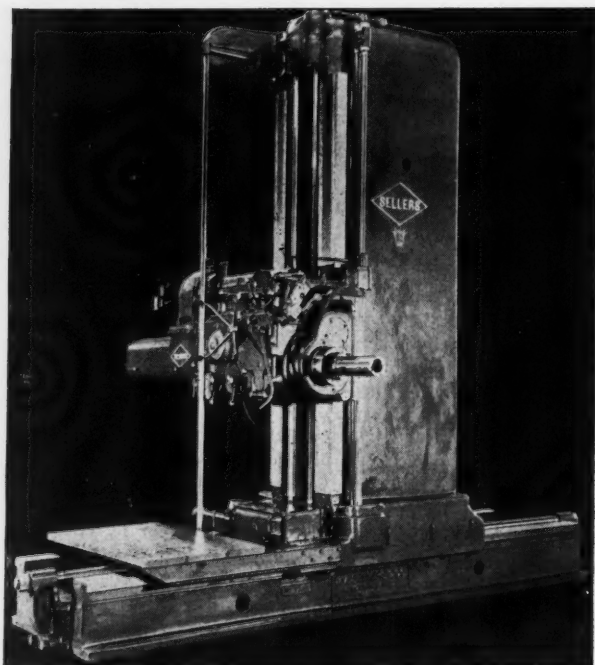


Established 1896
CINCINNATI, OHIO, U.S.A.

Electric DRILLS GRINDERS BUFFERS

Sellers 5-In. Horizontal Boring, Drilling and Milling Machine

The illustration shows the No. 504 Type A 5-In. Floor Type Horizontal Boring, Drilling and Milling Machine now being built by Wm. Sellers & Company, Inc., 1700 Hamilton St., Philadelphia, Pa. This thoroughly modern tool is designed to meet the most exact-



Sellers 5-In. Horizontal Boring, Drilling and Milling Machine

ing requirements of the metal working industries.

The floor plate upon which this machine is constructed is 12 in. thick and can be furnished in standard sections either 5x10 ft. or 5x12 feet. The floor plate is accurately machined at the joints and the sections are bolted and keyed together with close fitting steel keys and dowels. For standard construction, the T-Slots run lengthwise of the section. They are machined on 12-in. centers and take 1¼-in. bolts. Between the T-slots are rows of cruciform holes T-head bolts. The floor plate is of special alloy iron with a hard, dense, long-wearing surface.

The bed measures 44 in. across the ways. The front way is 7½ in. wide and the rear way 6½ in. wide. The column traversing screw is stationary, the nut revolving. The nut is of hard bronze and revolves in preloaded, anti-friction bearings. On machines having 16 ft. or more horizontal travel, the column traverse screw is supported and kept from sagging by a tumbler half-

bearing located about midway. Bed ways and column traversing mechanism are automatically and continuously oiled by a pressure pump and the bed ways are protected from dirt and chips by bronze scrapers and felt oil seals.

The distance across the column ways is 30 in. The front way is 8 in. wide and the rear way 6 in. wide. The column, for its entire height, is of heavy rectangular box section. It is neither tapered nor curved at the back, nor is there any reduction in the size and strength of internal ribbing. The column is not bolted to a saddle of the bed, but is of solid, one-piece construction from the top down to the gibs on the bed. The column bearing on the bed is 66 in. along the ways and 44 in. across the ways. The head is a complete power unit from the motor to the

spindle and contains the forward and reverse driving clutches, all speed and feed changes, and hand and power traverse to both spindles, head, saddle, and table. The driving motor is mounted on the head, giving the shortest, most efficient and most direct application of power to the cutting tools. All shafts are short, of heat treated alloy steel, multiple splined, and revolve in anti-friction bearings. All gears are of heat treated alloy steel.

The entire feed and traverse mechanism and driving mechanism are built in units. Each unit is readily removable from the head. Power to drive the machine is transmitted through multiple

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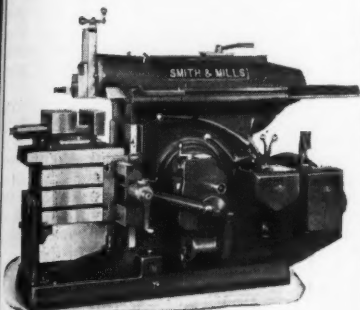
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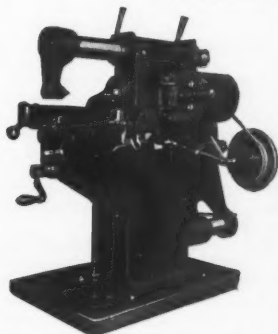
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Automatic lubrication—forced feed. Multiple die clutch and brake. Quick feed changes. Direct reading feed and stroke dials. Power rapid traverse to cross feeds.

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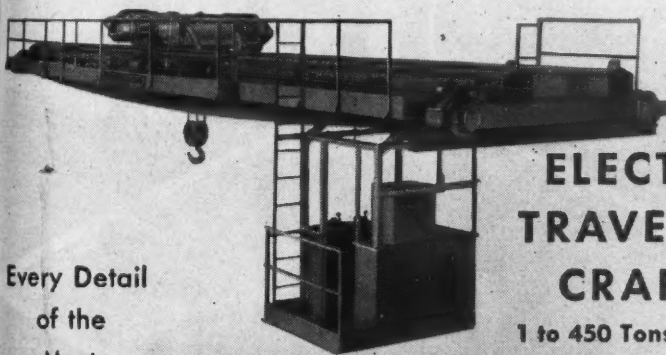
BURKE Milling Machines



Burke motor driven milling machines, Nos. 1, 2, 3 and 4 are specially suited for handling small, difficult work on a production basis.

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ELECTRIC TRAVELING CRANES

1 to 450 Tons Capacity

Every Detail
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SHEPARD NILES

CRANE & HOIST CORP.

424 SCHUYLER AVENUE, MONTAUR FALLS, N. Y.

A COMPLETE LINE OF CRANES AND HOISTS

disk clutches, both forward and reverse. The screw feed for the spindle operates with a steady, unvarying feed pressure. The entire head mechanism is automatically and continuously oiled. The head is rigidly clamped to the column from front to back and right to left. Adjustable tapered gibs provide for taking up wear in both directions.

The head is suspended by two counterweight cables so that it can not "cock" on the column when unclamped. The head is guided on the front way next to the cutting tools and the elevating screw is close alongside this guiding way, assuring the most accurate alignment when milling with the head feeding on the column.

The spindle and spindle bushings are of Nitralloy steel of approximately 750 Brinell hardness. The spindle sleeve is of heat treated steel and has an overall length of 41½ in. Preloaded Timken precision bearings are provided for both the front and rear of the spindle.

There are no overhanging driving gears; the slow speed driving gear is inside of and next to the front main spindle sleeve bearing. When milling, the spindle is clamped direct to the driving flange on the spindle sleeve, making the spindle and sleeve one unit.

The machine is controlled entirely

from the unit head. The main feed and reverse driving clutch lever is on the front of the head above the spindle where the operator can control the spindle movements with the cutters in full view. Speed and feed change levers are adjacent to the clutch lever, which permits shifting gears with one hand and operating the clutch lever with the other. Head and column feeds are independent and can be fed simultaneously or alternately.

A directional control lever provides for feeding the spindle in or out of the head without reversing the direction of spindle rotation. When used in conjunction with power traverse, the directional control lever provides for fast power movement of the spindle in or out of the head and eliminates winding the spindle in or out by hand.

A micrometer dial for accurately positioning the spindle is provided on the front of the head. A micrometer dial for final positioning of the head and column is provided alongside the pilot wheel. Hand adjustment with a micrometer dial is provided at the base of the column. As an extra, hand adjustment of the head, including the micrometer dial, can be provided at the base of the column for final positioning of the head from the floor.

PORTABLE TOOLS

High Frequency Electric
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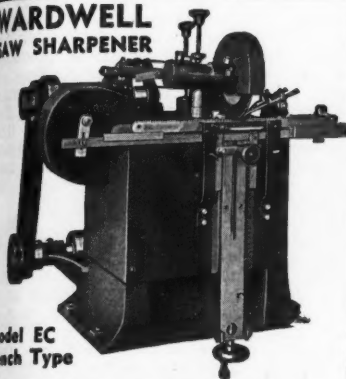
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Automatically Sharpens Hack, Band & Circular Saws

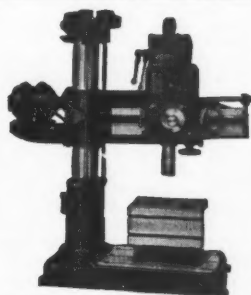
with teeth as fine as 32 to the inch,
at a speed of 30 to 75 per minute.

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The main spindle on the 4-in. machine has 24 speeds ranging from 8.8 to 505 r.p.m., and the auxiliary spindle has 14 speeds ranging from 150 to 1500 r.p.m. The main spindle on the 5-in. machine has 24 speeds ranging from 5.3 to 334 r.p.m., and the auxiliary spindle on the 5-in. machine has 14 speeds ranging from 100 to 1000 r.p.m. The main spindle on both machines has 24 feeds ranging from 0.0025 to 0.625 in. per revolution. The auxiliary spindle on both machines has 24 feeds ranging from 0.001 to 0.208 in. per revolution.

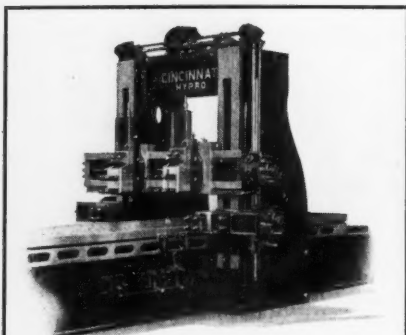
Limit trips are provided at each end of the spindle, head and column travel. The power traverse is friction clutch driven and acts as a safety device should obstructions be encountered between the limit trips. Electrical equipment includes one 15 h.p. 1750 r.p.m. 3-phase, 60 cycle 220 volt A. C. motor with disk-type motor-mounted solenoid brake, magnetic non-reversing starter and push button control.

Newton Drum Type Milling and Center Drilling Machine

A machine tool that combines the operations of face milling and center drilling both ends of shafts simultane-

ously has recently been built by the Newton Division of Consolidated Machine Tool Corporation, Rochester, New York. By doing both these operations on one machine, production time and cost have been lowered considerably. This new Drum Type Milling and Center Drilling Machine, as shown in illustration, uses a three-station Universal fixture arranged to dwell against index pins while drilling and loading. The cycle of operation is as follows:

- 1—Loading position is at front of machine. After work is loaded, the operator throws a lever which reverses the drill spindles that have just finished center drilling at the third station so that they back out and clear the work.
- 2—The operator releases the index pins, starts the drum in rapid approach, which changes automatically to feed, and both ends of the shaft are face milled. At the conclusion of the cut, the drum again changes to rapid traverse and stops against the index pins.
- 3—At this position, the operator throws a lever which starts the center drills into feed. While ends of the shaft are being milled and center drilled, the operator is unload-



PLANERS

Double Housing, Openside

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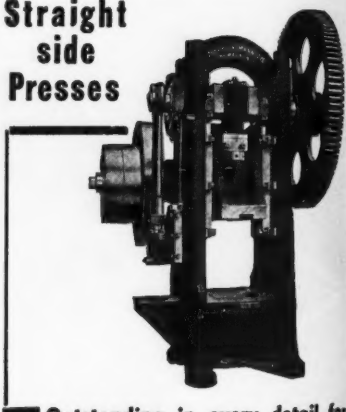
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Straight side Presses



Outstanding in every detail for heavy blanking and forming work. All stresses are taken centrally.

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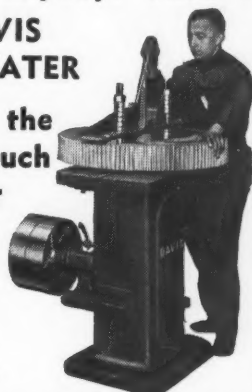
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THE GRANT MFG. & MACHINE CO.
96 Silliman Avenue Bridgeport, Conn.

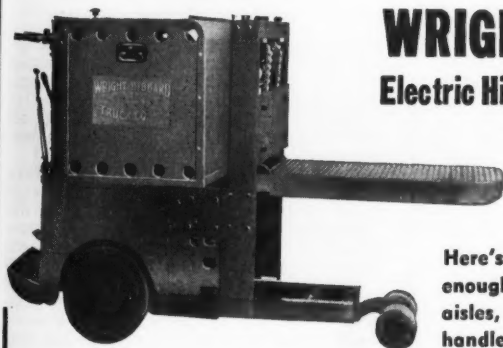
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Electric High-Lift Platform Truck

**SMALL
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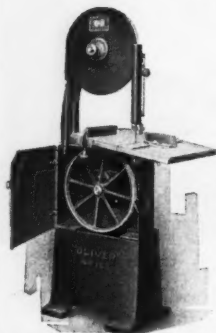
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Maximum lift—72". Loading platforms—18" to 28" wide and 34" to 53" long.

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"Oliver" Band Saw



This 18-inch Band Saw has all the refinements developed for larger "Oliver" Band Saws. Especially effective in sawing sheet steel. Also sprues of soft metal, ply-metal, hard rubber, compositions, etc. Has motor - on - shaft. Operates from light socket. A sturdy, precision-built machine in every detail.

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Meets all requirements for cutting **IRREGULAR SHAPES**—standard equipment furnished for ring and circle cutting . . . absolutely accurate and easily operated . . . metal is sheared and not punched . . . cut anywhere, no starting holes required for inside cutting . . . only one adjustment for various thicknesses of material used . . . unobstructed cutting vision . . . no further finishing required. No special cutters, pilots, templates, or strippers are needed . . . long life shear blades. Write for complete information.

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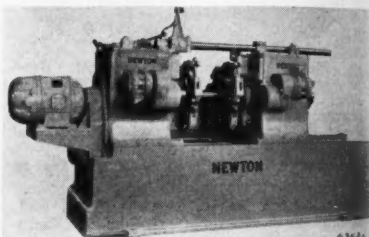
Manufacturers of shears since 1915

Libert Method

ing the finished work and reloading. After the holes have been center drilled the cycle is again repeated.

The two milling spindles are mounted directly opposite; one in each head. Each is mounted in Timken roller bearings and supported by sleeves having separate adjustment for setting the cutters to the desired depth. One head is bolted in a stationary position, and the other head is adjustable along the base. Both heads are driven from one motor mounted on a bracket near the floor and direct gear connected thru suitable reduction gears which are enclosed to operate in oil.

Two drill spindles are mounted directly opposite, one on each head. Each drill



**Newton Drum-Type Milling
and Center Drilling Machine**

spindle has separate motor direct gear connected thru suitable reduction gears, including pick-off gears for changing the spindle speed. Drill spindles are mounted in Timken roller bearings, and drive is mounted in anti-friction bearings throughout.

The drilling feed is obtained hydraulically as each drill spindle is mounted in a sleeve which is arranged to slide horizontally by the action of a small hydraulic unit mounted on the drill heads parallel to the direction of drilling feed. The oil for feeding the drill spindles is supplied by a hydraulic pump, with provision for regulating the rate of feed. Provision is also made for regulating depth of drilling.

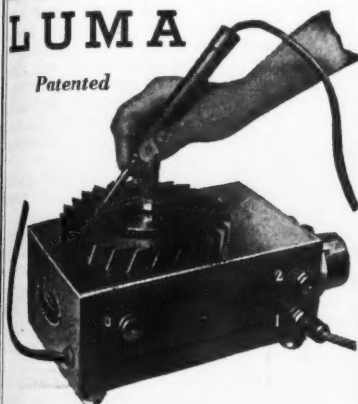
In addition to the milling and drilling spindles, each head contains a drum spindle for driving the work holding fixture. This drum feed is also hydraulically operated, thus giving a wide range of easily adjustable feed rates.

Adjustment is provided for taking up on essential bearings for the purpose of maintaining proper alignment.

A complete coolant system, including pump, piping and attachments is provided for supplying adequate amount of coolant to the cutters.

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Patented



Combination Demagnetizer and Electric Etching Pencil. Marks symbols in hardest steel. Demagnetizes instantly. One of our models popular in tool rooms for 15 years.

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CLEMENTS-CADILLAC Portable Gas BLOW TORCH

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No installation costs—does away with need for concrete bases; chimneys, etc. No expensive extra equipment needed. Comes complete as shown in picture. Costs only a few cents per hour to operate. Maintains steady temperature of from 1800 to 2300 degrees as desired, mixture regulated by adjustment of air mixing valve—and gas supply cock.



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The fixtures consist of two three-sided plates which bolt on each of the drum spindles. Each of these plates is fitted with three Universal chucks arranged to take interchangeable jaws. With this arrangement of Universal chucks and head adjustable along the bed—a wide range of sizes of shafts can be accommodated. Centering of the shafts in fixtures when changing sizes is facilitated by indentors on each head.

This machine requires four motors; one for driving the milling spindles, two for drill spindle drive and one for hydraulic feed motor for driving fixtures and feeding the drill spindles.

Landis Chaser Grinders

The Landis Machine Company, Waynesboro, Pa., manufacturers of thread cutting die heads and threading machines, announces a line of chaser grinders to replace the outdated Model "V" and No. 2 Grinders. The new line of chaser grinders consists of three models that cover the entire range of sizes of Landis Chasers, thus making available a machine that is suitable for any condition under which it might be required.

These grinders are all motorized, the grinding wheels being mounted directly on the armature shaft of the motor, thus

eliminating gear or chain drives. Two grinding wheels, one cup and one straight, are supplied as standard equipment. The grade and grain, as well as the size of the wheels used on these grinders, were selected because of their longer life and efficiency in grinding. Wheels that will not burn or damage the chaser in any way are absolutely necessary.

The straight wheel is used for grinding the rake angles of Landis Bolt Chasers where a leadscrew is not used. A rest that is adjustable to any angle is provided to facilitate this operation. The straight wheel may also be used for miscellaneous grinding. The cup wheel is used for grinding the lead and rake angles of all pipe chasers and bolt chasers when the thread is to be cut with the use of a leadscrew.

The motors used in these grinders are of the ball bearing, continuous duty type. A ball thrust bearing on the armature shaft assumes the thrust load of grinding chasers on the face of the cup wheel.

The Model "O" is a small machine designed primarily for the grinding of Landis Chasers for the smaller sizes of Landis Die Heads. The small size of the grinder makes it an ideal machine for departmental use where a number of Landis Die Heads are employed. The

ADJUSTABLE ANGLE TILTING TABLE

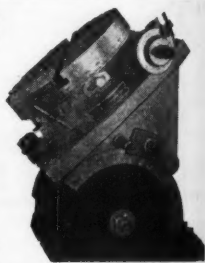
Suitable for adjustable angle machining by means of our $7\frac{1}{2}$ " Rotary Table, Vises or other holding fixtures.

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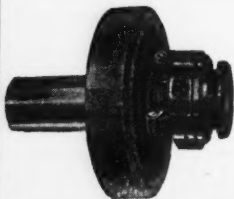
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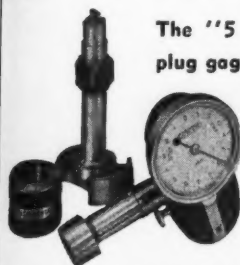
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Here's a rugged shop tool, accurate to $\frac{1}{2}$ of
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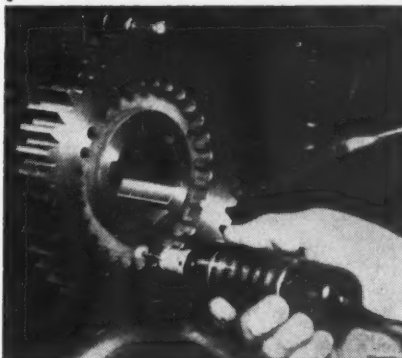


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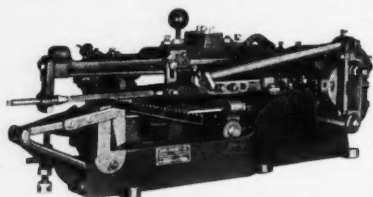


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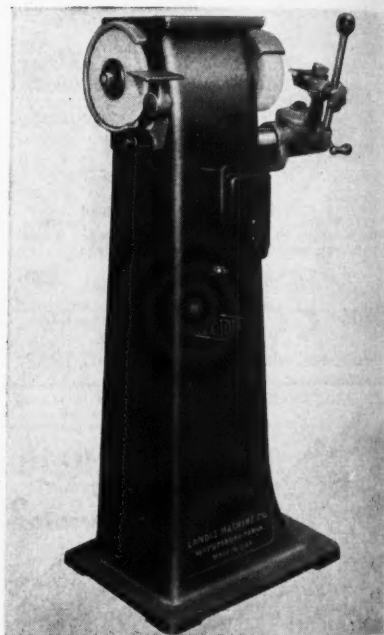
New Automatic Filer For Narrow Band Saws with quick return action, extra sturdy construction, for both accuracy and speed.

Developed by the pioneers in the industry.

COVEL-HANCHETT CO.
BIG RAPIDS, MICHIGAN

use of the Model "O" Grinder in departments eliminates the necessity of having a central grinding room and the waste of time that occurs by carrying the chasers to and from the grinding room.

The No. 1 Grinder is a heavier machine and may be used for grinding all Landis Chasers up to 1½ in. wide. This machine replaces the former Model "Y" Grinder and is said to be an ex-



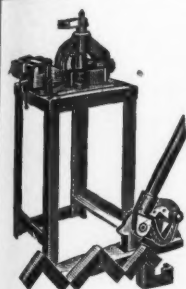
Landis Model "O" Chaser Grinder

cellent machine for use in tool rooms for the production grinding of Landis Chasers.

The No. 1½ Grinder is an extra-heavy duty machine designed for grinding the largest Landis Chasers under the most severe production conditions. This grinder is the only one of the three models in which means are provided for the use of a coolant on the cup wheel to reduce heat generation and, consequently, to eliminate the possibility of burning the chasers. A centrifugal pump, gear driven directly from the armature shaft and located inside the bed of the machine, provides a steady flow of coolant

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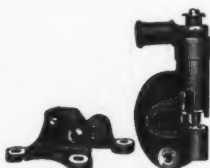
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cut, accurate
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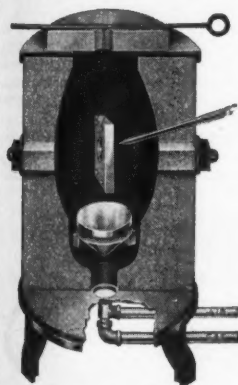


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from the large reservoir to the grinding wheel.

The Model $1\frac{1}{2}$ Chaser Grinder is also the only grinder in this line that employs a traversing table at the cup wheel end. The Model "O" and the No. 1 Grinder employ a new method for in-feeding the chaser and passing it back and forth across the face of the wheel. The swivel head in which the chaser is gripped for grinding is mounted on a cylindrical base. The cylindrical base operates on a spindle and is fitted with a long handle which is used to swing it in an arc parallel to the wheel. A

CHAMPION PORTABLE VISE STAND



A Movable Bench

Very Substantial

A great convenience in Assembling Rooms and Repair Shops.

Especially adapted for Automobile Repair shops.

Made in two sizes.
Furnished with and without vises.

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The Western Tool & Mfg., Co.
SPRINGFIELD, OHIO



Landis No. 1 Chaser Grinder

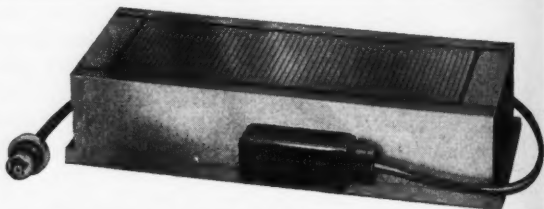
feed screw is provided through the spindle to infeed or withdraw the swivel head.

The infeed screw and the bearings on which the swivel head base operate are effectively protected from the possibility of grit entering the sliding surfaces. A sliding bushing in the machine bed extends into the cylindrical base and completely covers the spindle and feed screw. Provision is made for filling the bushing with heavy grease when the swivel head is withdrawn to the position where it would operate with a new grinding

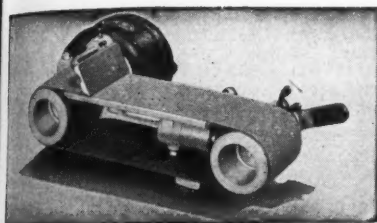
Set-up Time Becomes Production Time

Walker Magnetic Chucks save from 20% to 50% in chucking labor by eliminating slow-acting jigs and fixtures for metal removing operations on lathes, shapers, drills, presses, planers, grinders, etc. Write for catalog W 3.

O. S. WALKER CO., INC.
WORCESTER, MASS.



No. 617 Bar Pole Face Rectangular Magnetic Chuck
Available in sizes 6x10 to 12x60



• NEW An Inexpensive ABRASIVE BAND GRINDER . . .

"Built Like a Machine Tool"

The Hormel-M Grinder is sturdily built with a supporting leg under the grinding table to eliminate vibration and tipping due to pressure on the belt. Ball bearing throughout. Equipped with ALEMITE LUBRICATION complete with grease gun.

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HORMEL-M GRINDER

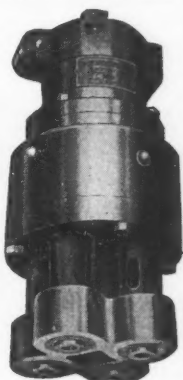
WALLS SALES CORP.

96 WARREN ST.

NEW YORK, N. Y.

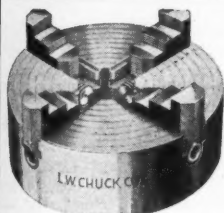
SPEED IN DRILLING

U. S. Multiple Drill Heads are made for drilling 4 to 50 holes at once. Thus, you get more holes per minute and larger profits. Our years of specialization in this work will save you money and assure an accurate, dependable and swift job. Send your blue prints for estimates.



**THE
United States
Drill Head Co.**

1954 Riverside
Drive
CINCINNATI,
OHIO



OUTSTANDING TOOL VALUES

4-Jaw Independent Lathe Chucks

**NOW MADE
IN 5 SIZES**

10 inch.....	\$29.00
12-inch.....	33.50
14-inch.....	38.00
16-inch.....	47.00
18-inch.....	62.75

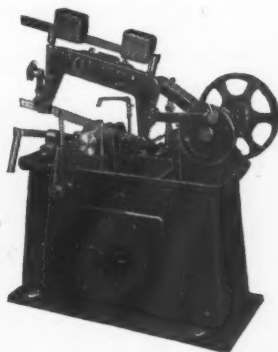
L-W Lathe chucks are built with semi-steel construction and heavily ribbed body to withstand unusual strains. Four independent jaws made of accurately ground and fitted hardened steel are reversible and have 1 1/4" tough nickel steel screws. Best material and workmanship guarantee satisfactory service.

High Speed 6x6 POWER SAW

Designed for maximum rigidity, this saw is accurate and efficient in operation. Automatic trip stops the machine on completion of the cut. Automatic relief of the saw blade on the non-cutting stroke is also provided. To make a clean and compact assembly, the coolant pump is mounted inside the base. Capacity is 6"x6", with 10"x14" blades.

\$160

Motor Drive
Arrangement
\$22.50
Additional



L-W CHUCK CO.

20 N. St. Clair St.

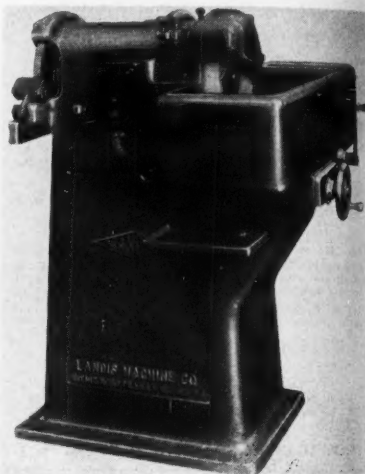
Toledo, Ohio

wheel on the machine. As the wheel wears and the swivel head is advanced, the heavy grease will gradually be forced out through all joints. The action of the grease coming out eliminates the possibility of grit or dirt working in.

An additional feature of this fixture is an adjustable stop for limiting the length of travel of the swivel head, parallel to the wheel. Although the usual practice is to grind the lip rake angle of Landis Chasers by hand on the straight wheel, it is now possible to grind the angle of the cup wheel, if desired.

A new type of swivel head is employed on all Landis Chaser Grinders. The

chaser clamping screw contacts the chaser on the dovetail surfaces in the same manner as the chaser clamp on a die head, thus providing a rigid and secure support to the chaser and insuring that the rake and lead angles are



Landis No. 1 1/2 Chaser Grinder

accurately ground. Rake and lead angles are said to be the same when the chaser is clamped in the die head. The swivel head is fully graduated so that any degree of rake and lead angle that is required may be obtained.

Although a Landis Chaser Grinder is not absolutely essential to the proper operation of a Landis Die Head, the accuracy with which the chasers are ground will be reflected both in the quality of the thread produced with the die head and in the chaser life.

Improved Anderson Balancing Ways

No Leveling
Required

A simple
and excellent
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balancing,
straightening
and truing.

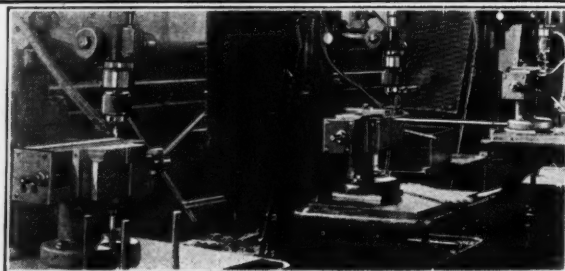
They are made in
the following sizes:

Swing	Greatest Distance Between Standards	Capacity in lbs.
20 in.	20 in.	1,000
40 in.	30 in.	2,000
60 in.	30 in.	2,000
72 in.	66 in.	5,000
96 in.	88 in.	10,000



Four Chilled
iron discs
rotate on
sensitive
special
bearings

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Made by **Anderson Bros. Mfg. Co.**
1926 Kishwaukee St., Rockford, Ill.



PRODUCTION DRILL- ING ON A "JOHN'S" DRILL JIG

125 "JOHN'S" JIGS
in use at this plant.
75% of their automo-
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tapped on these JIGS.

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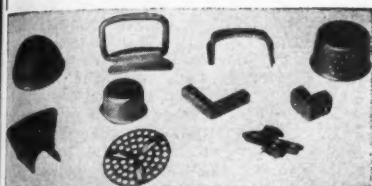
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STAMPINGS



Experience is the essence of manufacturing. We have over 20 years experience and a modern plant to do all types of specialty stamping and die making.

Send sample or blueprints for estimate to Dept. 1.

WUEST BROS.

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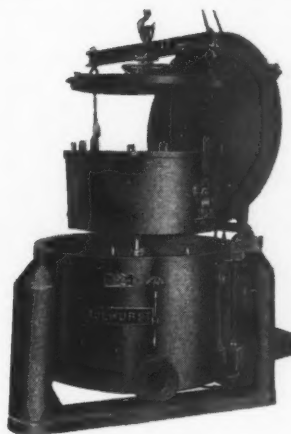
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RETURN THEIR COST MANY TIMES YEARLY

Tolhurst "Chip Wringers" reclaim up to 97% of cutting oil on crushed chips, save tool wear, reduce labor costs — provide one of the most profitable investments a machine shop can make.

A new folder "Tolhurst Chip Wringers", describing the savings these machines are bringing to their owners, will be sent you on request.

TOLHURST DIVISION

American Machine and Metals, Inc.

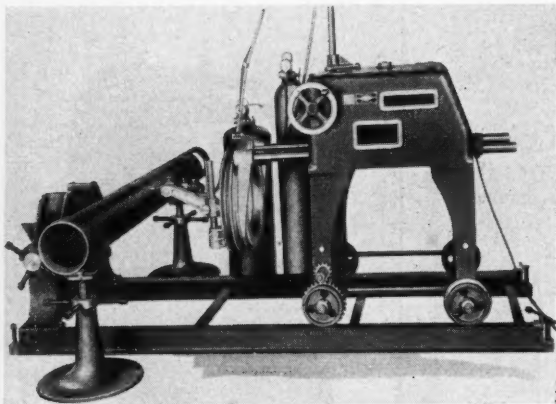
100 Sixth Avenue

New York

N. Y.

Oster No. 222 Torch Cutting Machine

The Oster Manufacturing Co., 2061 East 61st St., Cleveland, Ohio, has announced an improved model torch cutting machine to supercede their original Model No. 212. The new No. 222, which duplicates in design any pattern required



Oster No. 222 Torch Cutting Machine

for pipe welding jobs, does not require the use of cams, templates or special fixtures and it is claimed that the surface produced has the appearance of a lathe tool cut.

The cutting torch is guided by a mechanism which duplicates the motion of a torch held in the operator's hand. It will cut pipe from 2½ to 12 in., making tees, reducing tees 90 deg., branch reducing tees 45 to 90 deg., making elbows, miters, Y's and blunt bull plugs, as well as cutting holes.

The case containing the generating mechanism is mounted on four legs, which are equipped with flanged wheels running on a track. The pipe is centered in a vise and supported on roller pipe rests (if the length requires the additional support), for straight cutting for butt or tee welding. The adjustable torch carrier is then brought into the proper position. If a hole is to be cut in the pipe, it is placed at right angles to the torch carrier on the roller pipe rests.

The settings of the generating mechanism are regulated by positioning a rotating beam or lever which operates a reciprocating slide. The beams are marked to show the settings for the various sizes and types of cuts, so that it is a simple matter for the operator to make correct setting. The reciprocating slide, in turn, controls the movement of an oscillating lever which reproduces the movement in the torch carrier. The method of imparting movement to the rotating lever is through a

hand wheel, located at the side of the generating mechanism case, which also produces the drive for rotating the torch carrier ring around the pipe. The operating hand wheel is located conveniently for the operator where he can see the work clearly as it is being done.

The improved model is said to have been greatly simplified and, consequently, creates a greater saving in time over the methods employed by the original machine. Floor space required, is



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BULLETIN A

It gives a clear picture of WALES HOLE-PUNCHING and NOTCHING DIES and STRIPPITS—Their uses—and the savings they make possible—write for your copy.

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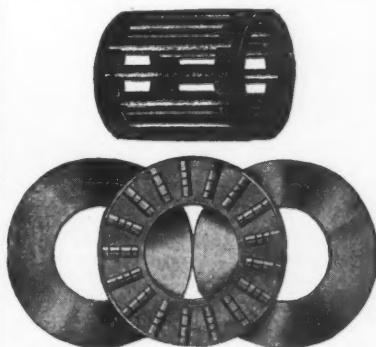


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Combination Center Drills
Will give more production at less cost. Be sure to demand Circle "R" Tools.

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BALL THRUST BEARINGS
ROLLER THRUST BEARINGS
JOURNAL ROLLER BEARINGS

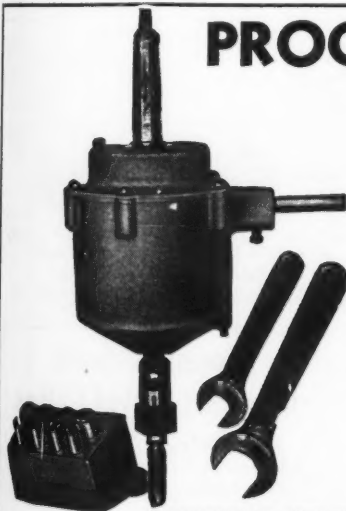
Special Bearings Made to Order.

Send Sketch or Sample for Quotation.

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Special Features:

CLUTCH—double-cone, cork-faced friction clutch. Sensitive, Powerful. Practically indestructible.

BALL BEARINGS—afford rigidity, accuracy, and long life.

REVERSE—speed twice forward speed through Patented Three-Point Balanced heat treated Gear Reversing Mechanism. Less strain and wear.

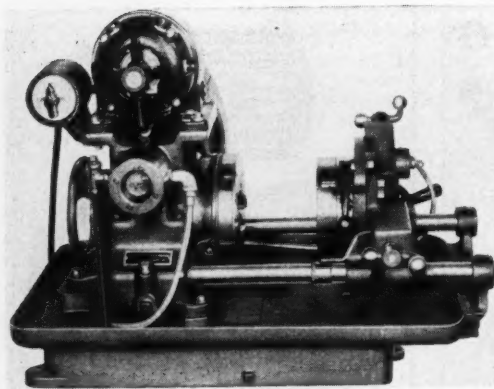
"TRU-GRIP"—collet type tap holder. Smallest and lightest of its kind. Most accurate and practical tap holder that ever held a tap.

PROCUNIER—Style "E" high speed tapping heads will cut your tapping costs. Write for new folder.

PROCUNIER SAFETY CHUCK CO.

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No. 512-A "Tom Thumb" Portable Pipe Machine

cluding the track unit, 3 ft. 4 in. x 9 ft.
Net weight, 3000 pounds.

No. 512-A "Tom Thumb" Portable Pipe Machines

The line of $\frac{1}{2}$ to 2-in. "Tom Thumb"
Portable Pipe Machines, product of The

Oster Manufacturing Co., 2016
East 61st St., Cleveland, Ohio,
has been rounded out by the
addition of the No. 512-A.

Equipped with a new type of
die head which is integral with
the carriage, the threading dies
are more rigidly supported and
their life is greatly lengthened.
In addition, more accurate
work is produced. The die
head is of the front cutting type
which, together with the ma-
chine's "close-grip" front
chuck, makes it possible to
handle pieces as short as $2\frac{1}{4}$
in. without using a nipple
chuck. The size setting marks
are on top of the head, where
they are plainly visible for
easier, more accurate settings.

An internal oiling system to
the dies and cut-off tool is
provided. A flexible hose car-
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to the intake valve in the die head, the
flow of oil being controlled by a two-way
thumb valve conveniently located for the
operator. The holder for the cut-off,
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crank. This rectangular tool holder, am-
ply supported, eliminates twist and pos-
sible breakage of the tools. The cut-off,



RIVETING?

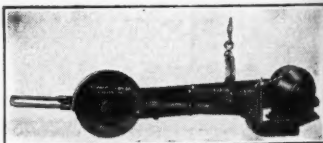
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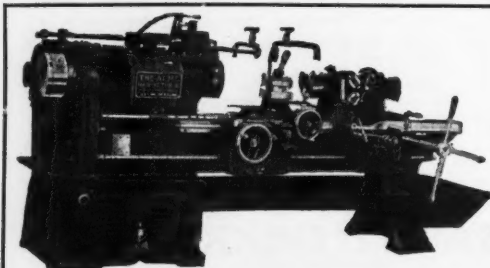
Send Samples of your Work
and we will furnish accurate
estimate of production and
quote cost of equipment.

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Sizes 14", 16", 18", 20" and 24" wheels
ASK FOR DESCRIPTIVE CIRCULAR
MUMMERT-DIXON CO.
120 Philadelphia St. Hanover, Pa.



Cincinnati Acme Universal Turret Lathes

A powerful rigid machine for a
wide range of accurate bar and
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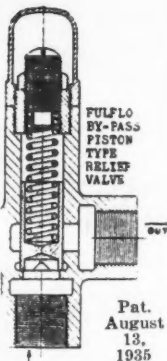
THE ACME MACHINE TOOL COMPANY
CINCINNATI, OHIO

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OIL BY-PASS RELIEF VALVE

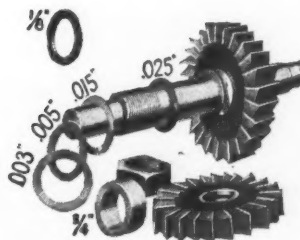
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Made in either
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ARBOR SPACERS

FOR quick set up of milling machine cutters, for slitters, gears, bearings. Made plain or with keyways and identification marks to order. Stock sizes .001 to .125 thickness. Special to any length, cut from bar stock, ground to decimal. Sold in bulk and also in the new, standard Cellophane, moisture-proof package offering visible inventory of spacers on hand.

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A trial assortment—enough for average use on one machine—sent for \$1.00. Give arbor size when ordering.

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**Standardized
JIG BUSHINGS**
Acme Standard
over 6700 Items
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Acme Drill Jig Bushings are made by the most exacting, scientific methods—insuring long wear, accurate fit, and absolute satisfaction. A standardized product, carried in stock for prompt delivery in over 10,900 standard items—all completely finished and ready for use. Special sizes made to order.

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reaming and chamfering tools are said to be of heavier construction than those ordinarily used on machines of the "Tom Thumb's" capacity.

The steady rest, which is necessary in the cutting-off, reaming and chamfering operations, is very solidly supported by a heavy rectangular block and is operated by a ball crank. The studs carrying the die head and carriage are longer than those used in the other models and are supported at the ends for greater rigidity. Dimensions are as follows: over-all length, 34 in.; width, 21 in.; height, 24 in., and net weight, 375 pounds.

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Accuracy—Prompt Service

Commercial Centerless Grinding Co.

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COLUMBIA LOCK-NUTS

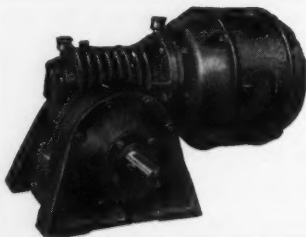


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**for every use
since 1900**

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Janette MOTORIZED SPEED REDUCERS FOR SLOW SPEED DRIVES

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Stanley Electric Drills

For use in production work where a light weight, quality drill is required, the Stanley Electric Tool Division, The Stanley Works, New Britain, Conn., has added four sizes of electric drills to



Stanley Electric Drills

their line of electric tools. The compact design of the drills, which are only 2¾ in. in diameter, permits close-quarter drilling in the aviation industry, coach and bus construction, furniture factories, and in the radio, electrical and automobile industries. The gears are of nickel steel, specially heat treated. Features of the drills include full ball bearing construction and a strong aluminum alloy housing.

Two sizes are available in 3/16-in.

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When you want gears, you will save time and money by sending your inquiry to **DIEFENDORF** . . . Cutters of all types of gears . . . from all metals and other materials. Let us quote on your next requirement.

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Abbott steel balls increase bearing stamina and win good will for the products in which they are assembled. Order from The Abbott Ball Co., 1056 New Britain Ave., Hartford, Conn.

ABBOTT
BEARING BALLS



Courtesy of Wickes Brothers

• for close machining limits

Spacing cutting-tool assemblies with shims made of **LAMINUM** (.002 or .003 in. laminations) gives complete assurance of precision adjustment. "An easy method," this machine tool manufacturer reports, "used by us on every tool assembly for the past eight years."

Leading Mill Supply Houses carry **LAMINUM** shimstock.

Also a complete and conveniently packaged line of brass and steel thin shim stock, and arbor spacers.

LAMINATED SHIM COMPANY, INC.
Mfrs. . . . Long Island City, New York
935A

LAMINUM
Precision adjustment SHIMS

capacity—the No. 362 and No. 362H. The No. 362 has an "On" and "Off" switch mounted in the rear end bell. The No. 362H has an automatic pistol-type handle in which a fully-enclosed double-pole switch is mounted. Two sizes are also available in $\frac{1}{4}$ -in. capacity, the No. 462 being similar to the No. 362, and the No. 462H being similar to the No. 362H.

Company, 1400 Clark St., Racine, Wis., is the newest addition to the line of small electric tools made by this firm. The Model 2 is similar in design to the Model 1 which has previously been made by this firm, but the Model 2 is sturdier, more powerful and speedier. The speed

Dremel Model 2 Moto-Tool

The Model 2 Moto-Tool illustrated here, product of Dremel Manufacturing



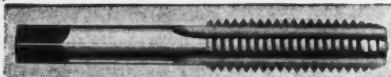
SAVE MONEY

and prevent accidents by using the Red E Safety First Belt Stick for throwing belts on and off moving pulleys.

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QUALITY TAPS of Alloy Steel—High Speed Steel. Made to meet the most accurate requirements and capable of taking the hardest punishment. Write for catalog.

KING TAP & TOOL CO., INC.
NORTH ATTLEBORO MASS.

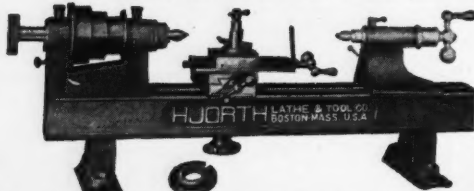


Model 2 Moto-Tool with Universal Moto-Tool Stand and Shaping Table

of the machine is 27,000 r.p.m. and it weighs 13 oz. Although larger and heavier than the Model 1 machine, this tool is still small enough and light enough to fit easily into the hand.

The tool is 1-11/16-in. diameter by 6 3/4 in. long and is powered by a motor which consumes about 60 watts. The

... for more than 1001 odd jobs



The Hjorth Bench Lathe has the speed, accuracy, handling ease, and dependability that appeals to every operator. That's why you'll find the better shops equipping with the Hjorth Lathe.

Write today for data and prices.

HJORTH LATHE & TOOL CO., 12 BEACON ST., WOBURN, MASS.

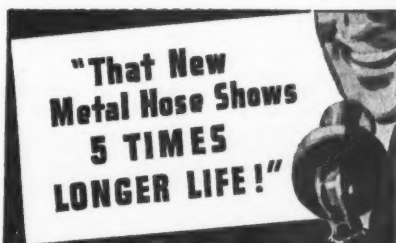
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the speed



For ALL Wheel Dressing Operations

The new EVER-SHARP DIAMOND TOOL is made with a long, natural shaped diamond—requires no resetting—is adapted to ALL types of wheel dressing operations—economical—accurate.

WHEEL TRUEING TOOL CO., INC.
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There's a Reason Why REX-WELD Outlasts Other Hose

● This new type jointless metal hose is fabricated from strip by exclusive new process of autogenous welding and "50-50" principle of tube corrugation—producing a stronger, more flexible, longer wearing hose—balanced strength units which provide maximum strength with minimum weight and cost. Send for Rex-Weld's record of performance and economy! Chicago Metal Hose Corporation, Maywood, Illinois (Chicago Suburb).

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THREE COST REDUCERS



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METAL WORKING SHOP

Almost every plant has use for one or all of these low - temperature - melting alloys. Among other useful qualities, they have the unique characteristic of expanding on solidification. Remarkable savings in many metal-working operations such as securing punch and die parts, reproducing master patterns,

filler for bending thin-walled tubing, electro-formed molds for rubber and plastic products, masks for spraying, proof casting for forging dies, anchoring parts in machine tools without drive fits and a hundred other uses.

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44 Wall Street,

New York, N. Y.

British Associates: Mining and Chemical Products, Ltd., London, England.

mechanism is housed in a sturdy, shock-proof bakelite housing. A wrenchless universal twin cone collet-type chuck is employed, located at the end of an oversize, hardened, ground and polished shaft running in large oilless trouble-proof bearings. A finger grip which is an integral part of the body of the machine makes it possible to hold the tool close to the chuck. Commutator brushes are large, for long wear, and can easily be replaced. A hanger is provided to hang the tool up to keep it clean and protect it from injury.

Among the accessories available is a Universal Moto-Tool Stand to which the Moto-Tool can be anchored so as to leave both hands free. The tool can be adjusted to any angle by means of a ball joint, fastened with a wing nut. The stand is of cast iron and neatly finished.

Another accessory is the Shaping Table which can be used with the universal stand for routing and grinding flat pieces to any desired shape. The table can also be used without the stand for grinding or routing to a predetermined depth. The Moto-Tool is shipped complete with a universal chuck, $1\frac{1}{8}$ -in. collet and No. 1-B52 wheel point.

Holo-Krome No. 22 Socket Screw Wrench Set

The Holo-Krome Screw Corporation, Hartford, Conn., has brought out a socket screw wrench set—the No. 22—



Holo-Krome No. 22 Socket Screw Wrench Set

which includes nine Holo-Krome "File Hard" surfaced socket screw wrenches. The wrenches fit all hex-type hollow set screws from No. 8 to $\frac{3}{4}$ in. diameter, all socket head cap screws from No. 8 to $\frac{1}{2}$ in. diameter inclusive, all sizes of socket head stripper bolts from $\frac{3}{8}$ in.

An All Purpose Air Velocity Meter



**Instantaneous
Direct Reading
No Timing
No Calculations**

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146 W. Austin Ave.

Chicago, Illinois



Flush type
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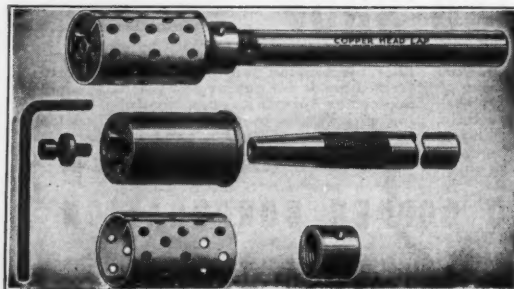
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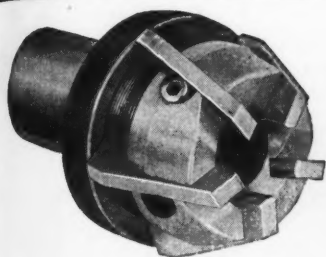
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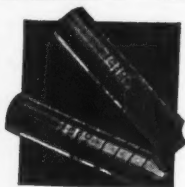
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Catalog 33 includes complete information and prices on all perishable parts and tools for all types of screw machines. Write for it today!

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to $\frac{3}{4}$ in. diameter inclusive, and all sizes of hollow pipe plugs from $\frac{1}{8}$ in. to $\frac{1}{2}$ in. diameter inclusive.

The nine wrenches are conveniently fitted into a compact metal box finished in black crackle. The corners of the box are reinforced, providing wear-proof construction.

Federal Model 1 Test Indicator with Universal Bar

The Federal Model 1 Test Indicator shown in the illustration has been placed on the market by Federal Pro-

ducts Corporation, 1144 Eddy St., Providence, R. I. This indicator is similar in design to the Model 2, which was announced on page 208 of the July 1935 issue of MODERN MACHINE SHOP. The difference is that whereas the Model



Federal Model 1 Test Indicator with Universal Bar

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Any Kind Any Material
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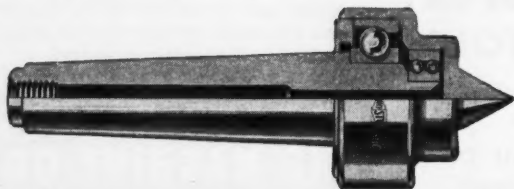
2 is graduated in ten-thousandths, the Model 1 is graduated in thousandths of an inch. The instrument has a range of 0.030 inch.

This same instrument graduated with metric scale in 0.005 mm with a total range of 0.2 mm, indicated as the Model 3, is also available as well as the Model 4, which is graduated by 0.01 mm with a total range of 0.8 mm. All instruments have the same dial and are identical as far as appearance is concerned.

Mauser Vernier Caliper

The line of Mauser Calipers marketed in the United States by George Scherr Co., 130 Lafayette St., New York, N. Y.

STURDIMATIC LIVE CENTER for LATHES, GRINDERS and MILLING MACHINES



It turns with the work. Eliminates friction of dead center. Lowest possible overhang prevents vibration and chatter.

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SPECIAL MACHINE BOLTS

Chromium Nickel Steel — Heat Treated
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SURPASS ALL.
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Chrome Like Finish.**

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Full Bearing Surface.

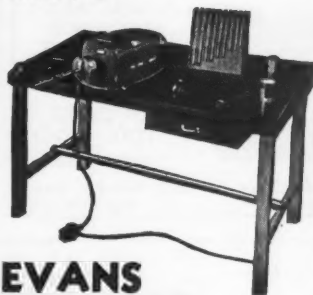
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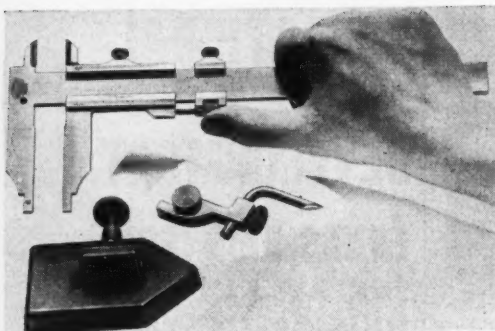
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REAMING
SHOP**

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3656 Lincoln Ave., Chicago, Ill.





Mauser Vernier Caliper

has been augmented by the addition of the Mauser Vernier Caliper shown in the illustration. The caliper is known as the No. 537 and is designed in combination with a height gage. A base is supplied which, when attached by means of a screw and tapered center to the end of one jaw, transforms the caliper immediately into a height gage. The tool is supplied in three sizes with measuring capacities of 7, 9 and 11 in. Graduations are 1/1000 and 1/128 inch.

The base is of improved design, comparatively large and heavy, so that the height gage will rest firmly on the surface plate without danger of tilting. The vernier caliper has two knife edges which are extremely practical for layout work and also for measuring distances between holes, for measuring root diameters of gears and so on.

The scribing attachment is a separate unit and may be firmly attached to the upper jaw. The scribing attachment has an advantage in that the steel point is adjustable, making it possible to set the height gage at an even figure of the scale when starting to measure.

This feature eliminates a great deal of calculation and saves time.

"Unbrako" Self-Locking Hollow Set Screw

The line of "Unbrako" Hollow Set Screws made by the Standard Pressed Steel Co., Jenkintown, Pa., has been augmented by the addition of the "Unbrako" Self-Locking Hollow Set

CAMS

ALL SIZES
ALL SHAPES

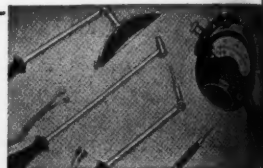


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Chicago RAWHIDE HAMMERS

... stop battering, crashing, marring — save machinery and equipment. Weighted Malleable heads give power, balance and accuracy. Coiled Rawhide faces cushion blows. All sizes.

Replaceable insert faces are self-tightening, self-aligning.

CHICAGO Rawhide MFG. CO.
1280 ELSTON AVE. CHICAGO - U.S.A.

Screw shown in the illustration. This set screw is so designed that it can be screwed into a hole without difficulty, but locks itself in the hole so that it can only be removed with difficulty and it is practically impossible for it to work loose in service.

To achieve this effect, the two top threads are milled at an angle, the metal being swedged to the upper side so that resistance to insertion is eliminated. As the setscrew is screwed down so that the cup point of the screw is forced into the shaft, the threads of the screw back up against the threads

of the hole and the prongs of the milled threads dig into the threads in the hole, thereby effectually locking the screw in position. It is, of course, necessary that the Unbrako screw, when tightened in position, be flush or slightly below the



"Unbrako" Self-Locking Hollow Set Screw

SpeedWay

Portable GRINDERS

Does a Hundred Jobs Well
 Priced low, still built to industrial standards. 123 Grinder is a lighter, (all aluminum) handier, hand or lathe tool. Universal Motors take grinding wheels to 1 1/4". In case with collet, wrench and three wheels.



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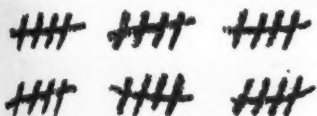
surface of the work-piece, as otherwise the knurled threads would not engage the threads in the tapped hole.

The "Unbrako" Self-Locker is said to work equally well in steel cast iron, bronze and other metals. The first application is the most difficult, as backing off causes the prongs to wear. It is possible, however, to back the screw off several times before the locking qualities are lost.

36x42-inch Wheelabrator Tum-Blast

A new model 36x42-In. Wheelabrator Tum-Blast has been announced by The American Foundry Equipment Company, 555 S. Byrkit St., Mishawaka, Ind. Many new features have been incorporated in the design of this centrifugal abrasive blast cleaning equipment. Fabricated steel side frames replace cast iron frames formerly used, making the unit much stronger. Welded corner and joint construction assures extra ruggedness and dust-free operation.

Centrifugal force is utilized in whipping steel abrasive onto metal pieces being cleaned in the 36x42-In. Wheelabrator Tum-Blast, a gentle tumbling and complete exposure of all parts in the blasting zone being attained through the use of an endless conveyor apron.



This is one way to count

production of pieces. A much more reliable and time-saving way is to make your machines count as they produce by putting Durant Productimeters on them. We have counters for any type of metal working machine and any field of industry.

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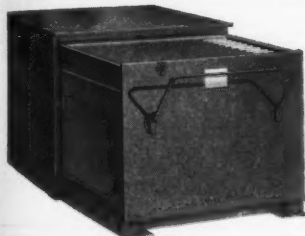


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New! HAMILTON-CALUMET VERTICAL PLAN FILE



File drawer is operated on progressive roller bearings, permitting a heavy load to move smoothly and easily. A girl can operate the file by hand if air compression feature is not desired.

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IT MAKES FILING EASIER . . . each folder holds 50 tracings, held upright by spring compression. The file has a capacity of 60 folders, or 3,000 tracings. Investigate this remarkable new file at once. Use the coupon below.

HAMILTON MANUFACTURING CO.

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Dept MS-11-37

Please send me complete information on your Hamilton-Calumet files.

Name Title.....

Firm Name.....

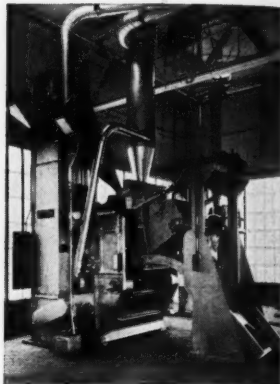
Address

HAMILTON Drafting Room FURNITURE

An improved suction-type abrasive separator is included at the elevator head as standard equipment on the new model. This separator effectively keeps the abrasive clean by removing dust and broken down abrasive after burned molding sand, forging scale and other foreign material are extracted by the rotary screen.

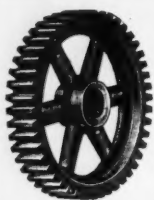
The 36x42-In. Wheelabrator Tum-Blast, with the standard conveyor, will clean metal parts weighing up to 30 lbs. Pieces weighing as much as 75 lbs. can also be cleaned, when the machine is equipped with a heavy-duty conveyor.

Complete information on this new model and other types of Wheelabrator equipment is contained in Catalog No.



36x42-In. Wheelabrator Tum-Blast

211, which can be obtained from the manufacturer.



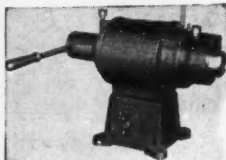
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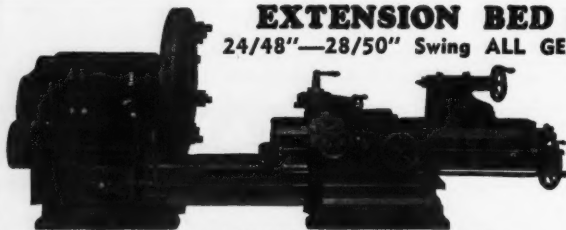
Bristol Portable Traveling Oven Temperature Recorder

A Portable Recording Thermometer for use in travelling baking ovens, finishing ovens, enameling ovens, etc., has been developed by The Bristol Company, Waterbury, Conn.

The instrument passes through the oven on the conveyor with the "work" and gives a continuous record of the temperatures to which the heated product is subjected as it passes through the oven. The thermometer is especially useful in large enameling ovens in plants where electric and gas heaters and ice refrigerators are manufactured. It is

EXTENSION BED GAP LATHE

24/48"—28/50" Swing ALL GEARED OR CONE HEAD



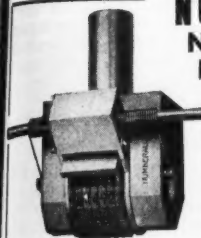
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Name plates, steel and other metal parts, tools, metal checks, badges, etc.



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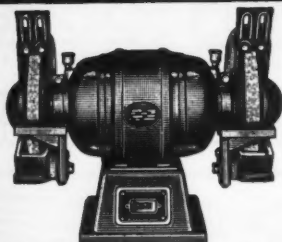
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Platform No. 44

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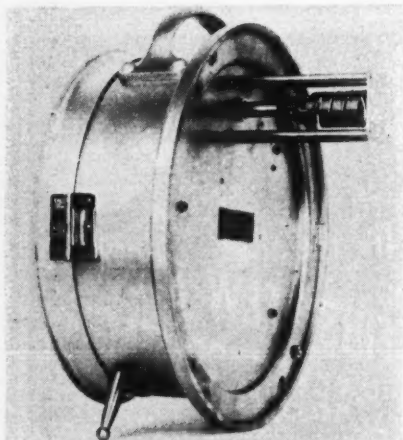
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Bristol Portable Travelling Oven Temperature Recorder

also extensively used in ovens for treating the finish on automobile bodies. In this type of work it is valuable in maintaining the proper temperature for the color of the finish desired.

The Bristol Portable Recording Thermometer is light in weight, compact, and self-contained. The temperatures are recorded on an 8-inch round chart for 24-hour or 7-day clock rotation.

Janette Blower Wheels

Janette Manufacturing Company, 556-558 West Monroe St., Chicago, Ill., is now manufacturing a line of blower wheels for use with air conditioning equipment, oil burners, coal stokers, and other apparatus where a blower of this type is needed. The wheels are made from a special grade of soft, durable steel with rigid steel back plates. Hubs are of steel or cast iron, depending upon the size of the wheel.

The blades are die-formed in pairs (except on double-inlet wheels 7 in. and larger in diameter) exactly alike in form, thickness, and weight. A single piece of 1/32-in. thick soft steel is formed into two blades, the section joining the blades being spot-welded to the back plates and the open ends being pressed into the slotted inlet disc and bent over smoothly, which is done with a special machine. On the larger wheels, these ends are also welded for added strength.

The forward curvature of the blades

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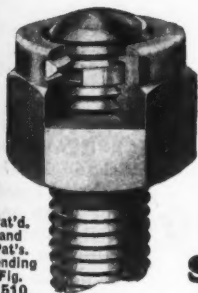


VIBRATION LICKED AT LAST

IT JUST CAN'T LOOSEN



SELF-LOCKING NUT



Pat'd.
and
Pat's.
Pending
Fig.
1610

Machines that have been regularly shaking loose from nuts intended to hold them tight are licked when the "Unshako" is applied. By working on the brake band principle the integral self-locking ring causes the nut to stay put whenever vibration tries to shake it loose. Yet the nut turns down easily and backs off easily, too, with just the help of a regular wrench. "Unshako" has no separate pins, washers or other gadgets to bother with. If vibration is an old time enemy of yours, here's your best bet—send for the facts about "Unshako".

STANDARD PRESSED STEEL CO.

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BOX 556

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ST. LOUIS

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Cutout section
showing Locking
Ring in place.

is scientifically designed to give the wheel high operating efficiency and a large volume of air output with a minimum of air noise.

The hubs of the smaller size wheels are machined from solid stock, and the larger hubs are of cast iron. Either internal or external hubs are available. Steel hubs are locked to the back plates by three embossed keys which, when the back disc and hub are pressed together, fit into recesses in the disc. The end of the hubs which projects through the disc is then spun over to form a smooth joint. Cast iron hubs are fastened to

the back discs by three rivets.

All wheels are statically balanced and finished with rust-resisting baked aluminum finish. Wheels can be furnished in sizes ranging from 5x1 to 12x6 in. single inlet, and 5x4 to 12x12 in. double inlet types.



Janette Blower Wheel

PRECISION BORING

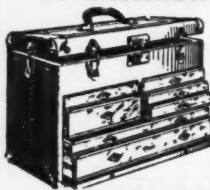


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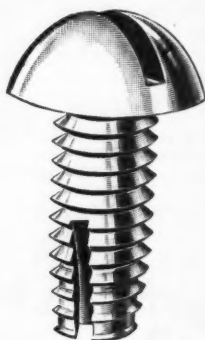
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Shakeproof Thread-Cutting Screw

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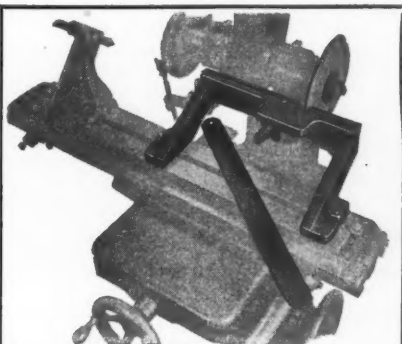
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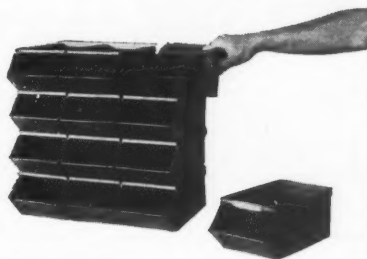
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tapping operation normally required in the use of standard machine screws.

Important production savings in both labor costs and time are assured by the use of this new fastening method and, because the screw remains in the threads it has cut, a better fastening is certain. Another advantage is the fact that, should it ever be necessary to replace the screw, an ordinary machine screw of the same size will fit its threads. A free demonstration kit of Shakeproof Thread-Cutting Screws, including an assortment of different sizes and complete instructions for testing, can be had

by writing the Shakeproof Lock Washer Company, 2501 North Keeler Avenue, Chicago, Illinois.

Spencer "Speedy" Steel Type Holder and Steel Type

The illustration shows a type holder which has been placed on the market by S. M. Spencer Mfg. Co., 3 Cornhill Boston, Mass. As the name implies, the tool is made for the speedy changing of figures or letters used for marking such products as hardware, name plates, machine parts, and so on. The holder itself is of fine tool steel, hardened and tempered. The main body is fitted with a spring clip on one side only, which presses into a groove in each type to hold it in position. The type can instantly be released by pressing a button on the end of the clip. No set screws are required. The type are held in perfect alignment.

The steel type made by this firm are of finest tool steel, with the character finely engraved in the exact center of the type body for perfect alignment. The type are also carefully hardened and tempered. Type are made in a variety of sizes, most of which are carried in stock for immediate shipment. Special sizes can be made up to order.

Modine Blast Heater

A blast heater for heating, ventilating, air conditioning and process application



Improved "AMERICAN" Amplifying Gauge

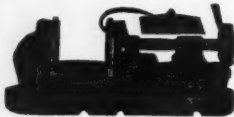
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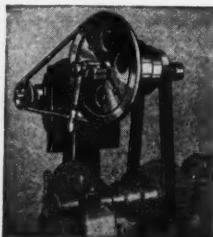
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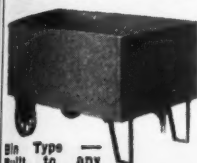
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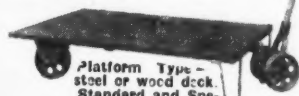
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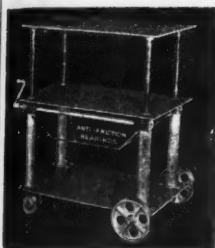


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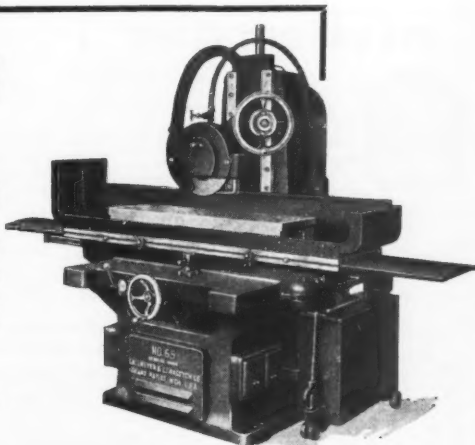
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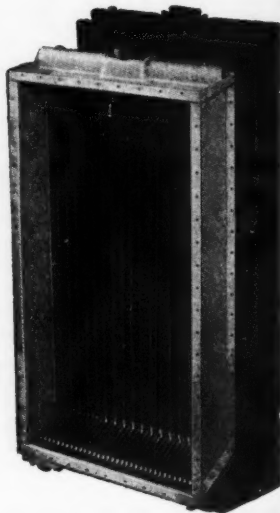
308 STRAIGHT AVE., S. W., GRAND RAPIDS, MICH.

has been announced by Modine Manufacturing Company, Racine, Wis. Incorporated in this blast heater are several features of design which are said to materially increase structural strength and make for more effective high heat transfer.

According to the manufacturer, one of the outstanding features of this heater is elimination of expansion strain. The expansion bend (patented) allows each tube to expand and contract as its temperature requires without affecting the tube adjacent to it, thus eliminating expansion strain and the possibility of

leakage resulting from this strain. Headers and tubes are cylindrical and seamless for greatest possible structural strength. Tubes and headers are brazed into a single rugged unit without the use of gaskets, bolts or screw joints.

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ing headers, tubes, and inlet and outlet bosses, are of pure copper or copper alloy from the point where the steam enters to where it leaves in the form of condensate. It is claimed that all electrolysis probabilities are thus eliminated. Fins are metallically bonded to tubes to make a permanent junction impervious to years of operation under



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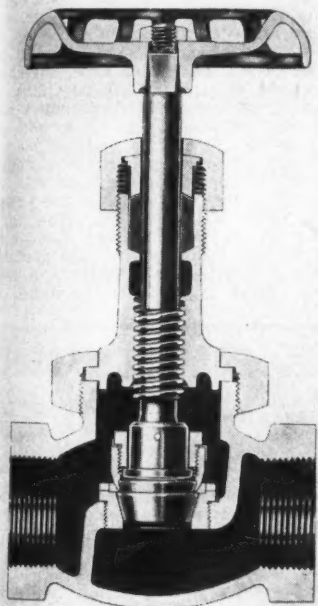
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high temperatures. Increased heat transfer is promoted by scientifically die-forming fins to give effective turbulence to air.

To approximate final temperature and physical size requirements more closely, the Modine Blast Heater is available in a large variety of sizes and capacities—a total of 252 different heaters.

Jenkins Plug-Type Valve Seat

Jenkins Bros., 80 White St., New York, N. Y., have announced the Jenkins Plug-Type Plug-Seat Valve, the feature of



Jenkins Plug-Type Valve Seat

which is that the plug and seat ring are made of a superior stainless steel having a Brinell hardness in excess of 500 known as Jenkins JX500. The valve is especially recommended for severe service such as continuous throttling for pressure reduction or free blow duty such as soot blowers, injectors, heating coils, or any steam line where close regulation is required. It is said that the Jenkins JX500 Plug and Seat practically nullify wear and almost entirely elimi-

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Stanley Pocket "Flash-Lite" Screw Driver

Stanley Tools, New Britain, Conn., now offers a small size pocket "Flash-Lite" screw driver with clip, designed for use



Stanley Pocket "Flash-Lite" Screw Driver

by householders, car owners, auto mechanics, radio, refrigerator and oil service men who need a handy sized screw driver for working in dark places. The handle, octagon shaped, is made of brass and is finished a crystal black with a contrasting orange stripe. It holds one standard battery and light bulb. The screw cap and clip are nickel plated. The blade, two in. long and $\frac{1}{8}$ in. in diam-

eter, is made of tempered steel and has an accurate machine cross-ground tip. Battery and bulb can be replaced easily when worn out.

Taylor Self-Centering Scroll Chuck

George Scherr Co., Inc., 130 Lafayette St., New York, N. Y., is now marketing the Taylor Self-Centering Scroll Chuck shown in the illustration. This chuck is designed for the maximum of strength and is especially intended for use with high speed machine tools where tungsten carbide cutting tools are used.

A feature of the chuck is the cone-shaped design. The chuck jaws grip the work in the same manner as the jaws of any other three-jaw chuck, but instead of having a flat face, the chuck face is cone-shaped, thus providing the maximum of support for the chuck jaws. The ways in which the jaws slide are cut into the face in the usual manner. The back retains the internal working parts of the chuck in position and contains the recess for locating the adapter. In all sizes above $8\frac{1}{2}$ in., the central portion of the body passes through the back of the chuck, giving the maximum of strength with the minimum of depth.

The spiral is of steel, hardened and

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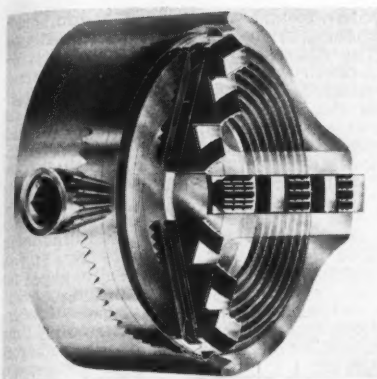


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Taylor Self-Centering Scroll Chuck

ground perfectly true. Teeth are cut into the back of the spiral and the spiral is revolved by means of any one of the three pinions. Upon the cone-shaped front face is cut a spiral V-thread which engages with the teeth cut in the back of the jaws, thus advancing or withdrawing the jaws simultaneously

and gripping the work true without setting. The unusual rigidity and strength of this chuck is due to the fact that the jaws are supported immediately behind and at right angles to the line of pressure applied when the work is gripped. This construction enables the important working parts to be hardened, and it is said to be impossible to strip or bend the teeth at the back of the jaws or to tear out the body ways in the chuck body.

The regular jaws are made of special steel and are hardened all over, after which they are ground perfectly true on the parts which slide in the chuck body and, in position, on the parts which grip the work. Soft jaw blanks can be provided, especially adapted for holding odd shapes of work. The front part of these jaws is left soft so that they can be machined as required to hold the work, but the teeth at the back are hardened and the parts which slide in the chuck body are hardened and ground. The bevel pinions for revolving the spiral are of chrome nickel steel, electrically heat treated and ground and tested before assembling.

The chuck is made in sizes of $4\frac{1}{2}$, $5\frac{1}{2}$, $6\frac{1}{2}$, $8\frac{1}{2}$, $10\frac{1}{4}$, $12\frac{1}{4}$, $16\frac{1}{4}$ and 20 in., weighing from $8\frac{3}{4}$ to 246 pounds.

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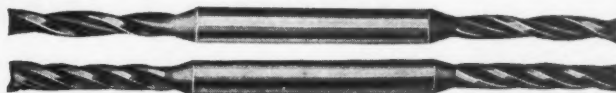
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New Literature

Outdoor Lacquer No. 4917, a brass and silver lacquer for outdoor exposure, is described in a product summary issued by Roxalin Flexible Lacquer Co., Inc., Elizabeth, N. J. Unusual adhesion and high resistance to "spotting out" are advantages claimed for this clear, cellulose type, air-drying flexible lacquer. Copy free upon request.

Chicago Pneumatic Bulletin 762. The Diesel engine-driven compressors of the Class WO-2 Portable Type and the Class W-CO stationary Type products of Chicago Pneumatic Tool Company, 6 East 44th St., New York, N. Y., are described and illustrated in an eight-page folder now being issued by this firm. Also included is information on CP Aftercoolers for the removal of oil and moisture from compressed air. Copy free upon request.

Rex-Weld and Rex-Tube Flexible Metal Hose Catalog. In this catalog, the Chicago Metal Hose Corporation, Maywood, Ill., presents detailed information on their line of Rex-Weld and Rex-Tube

Flexible Metal Hose for use with saturated steam, superheated steam, fluids, chemicals, and for certain special uses. The construction of the tubing is described with the aid of cross-section drawings. Numerous industrial applications of the tubing are cited, and the characteristics and advantages of this type of connection are discussed. Instructions for ordering are included. Copy free upon request.

Wales Dies. The Strippit Corporation, 1559 Niagara St., Buffalo, N. Y., has published an attractive eight-page bulletin covering the Wales Individual Self-Contained Sub-Press Type Notching Dies, Punching Dies and Stripping Units made by this firm. These dies may be set up in any number of patterns to punch holes and cut notches in flat sheets and parts. Wales dies may be set up in many ways, the three principal ones being (1) on templates, (2) on T-slotted plates and (3) in press brakes. The advantages and applications of these dies are described and illustrated with photographs and drawings. One page is devoted to a discussion of the use of Strippits in connection with stripper plates for punches and dies. Copy of Bulletin A free upon request.



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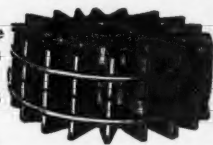
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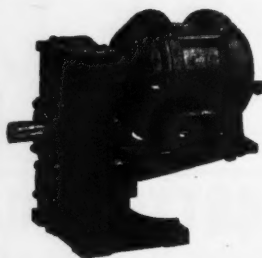


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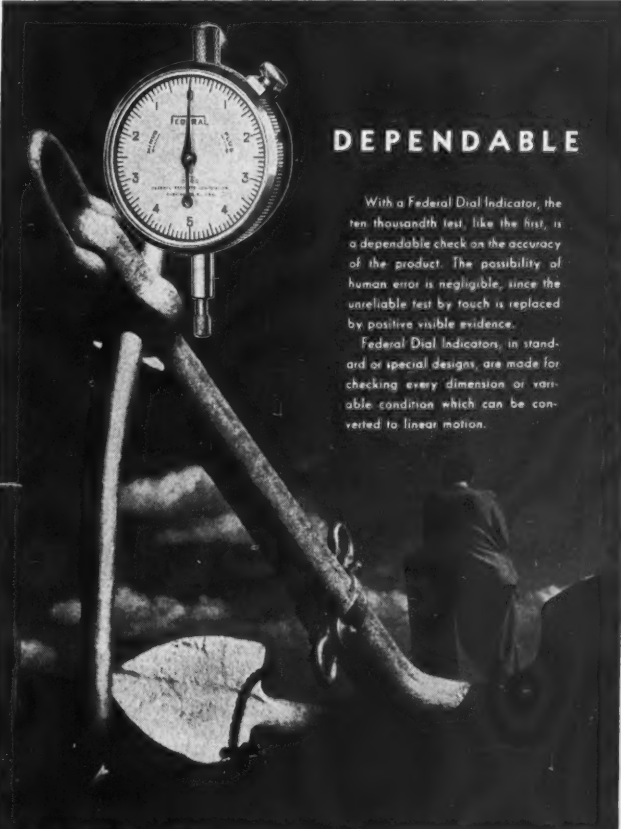
"Handle It Off the Floor" is the title of a bulletin which features P&H Hoists and illustrates many practical applications of these hoists in all branches of industry. Copy free by addressing Harnischfeger Corporation, 4535 W. National Ave., Milwaukee, Wisconsin.

No. 35 Cross Gear Tooth Rounder Bulletin, issued by Cross Gear and Machine Company, 3250 Bellevue Ave., Detroit, Mich., is devoted to the presentation of the No. 35 Cross Gear Tooth Rounder. This machine can be used not only as a single purpose tool, maintaining high efficiency in mass production, but also as a tool that is universal in its application to many different pieces and operations. A number of views of the machine are shown and a list of specifications is included. Copy free upon request.

Cross Milling, Gear Pointing and Chamfering Machines. Two new models, designated as the Nos. 40 and 41, have been added to the line of milling, gear pointing and chamfering machines manufactured by the Cross Gear and Machine Co., 3250 Bellevue Ave., Detroit, Mich. The machines, which are automatic, are built with an integral indexing mechanism and complete electric control, and may be tooled up for internal and external gear tooth chamfering operations on either spur or helical gears. Illustrations of the Nos. 40 and 41 are included, together with views of the various parts of the machines. The folder contains

complete descriptions and specifications. Copy free upon request.

discussion of the features and advantages of the Carbonol Process for carburizing steels in the Hevi Duty Carburizer is presented in Bulletin HD 937, published by the Hevi Duty Electric Company, Milwaukee, Wis. The booklet is well illustrated with photographs and drawings, and includes specifications covering the five types of Hevi Duty Carburizers. Copy free upon request.



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Catalog E of Hotspot Electric Soldering Irons. This four-page bulletin illustrates and describes the line of electric soldering irons made by the Vasco Electrical Manufacturing Co., 4116 Avalon Blvd., Los Angeles, Cal. Specifications and prices are included. Copy free upon request.

Handy Flux Bulletin No. 9. A low temperature flux for brazing steel, stainless steel, monel metal, nickel, copper, beryllium-copper, brass, bronze, aluminum bronze and various other ferrous and non-ferrous metals and alloys, to be known as Handy Flux and marketed by Handy & Harman, 82 Fulton St., New York, N. Y., is described in a four-page folder now being issued by this firm. Outstanding features of Handy Flux and directions for its use are also included. Copy free upon request.

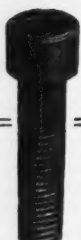
Star Hack Saw Blade Catalog No. 51. This attractive 24-page catalog issued by Clemson Bros., Inc., Middletown, N. Y., opens with a section devoted to the history of Clemson Bros. and the development of Star Hack Saw Blades. Another section gives suggestions for the proper use of hack saw blades. Descriptions, illustrations and specifications covering the complete line of Star Hack Saw Blades are presented. A feature of the booklet is the explanation of the five points of the Clemson Star—Clemson Experience, Clemson Steel, Clemson Teeth, Clemson Set, and Clemson Heat Treatment.

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New Profits in Arc Welding with the New Simplified 40 Volt Hobart Arc Welder. This booklet, a publication of Hobart Brothers Co., Troy, Ohio, includes chapters on the following subjects: Types of Job Welding Shops, Types of Welding Equipment, Where an Arc Welding Job Shop Will Pay, Special Training for General Job Welding, Essential Equipment for the Job Shop, Other Desirable Equipment, Why Arc Welding is Most Important, Extra Profits from Portable Equipment, Customers of the Job Welding Shop, How to Build a Job Welding Business, How to Set Prices on Job Welding, Choosing the Right Size Welding Machine, and What to Look for in a Welding Machine.


The booklet is well illustrated with installation photographs showing Hobart Arc Welders in use on a variety of jobs. Copy of the booklet free upon request.

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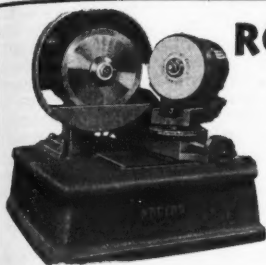
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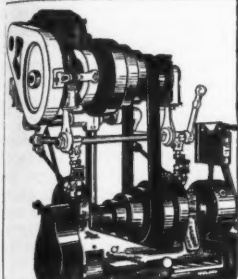
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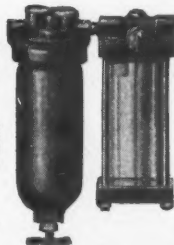
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DETROIT, MICH.

Lubrite Bushings. What Lubrite Oil-less Bushings are and how they work is discussed in a folder published by Merriman Bros., Inc., 185 Armory St., Jamaica Plain, Boston, Mass. The bushings are suggested by the manufacturer for use without oil, for heat applications, for cleanliness and inaccessibility, for heavy and shock loads, and for water, dust and dirt. Copy free upon request.

Laminated Brass Shim Stock Specifications File. Of especial interest to chief designing engineers and their staffs is a convenient new specifications file folder issued by the Laminated Shim Company, Long Island City, N. Y. The file presents detailed specifications of Laminated Brass Shim Stock, known as Laminum, in such handy form that essential information on the materials, their composition and degree of lamination, stock size, and so on, is available at a glance.

Copy free by addressing Laminated Shim Company.

Gisholt Heavy Duty Turret Lathes. Gisholt Machine Company, 1217 E. Washington Ave., Madison, Wis., announces the publication of a new catalog which

covers the complete line of Gisholt Improved 3AL, 4L and 5L Heavy Duty Turret Lathes and optional special attachments, mechanical and hydraulic chucks and standard tool sets. The optional equipment is said to readily adapt the machines to individual requirements. The catalog describes the many improved features of the lathes that make for maximum production, greater accuracy and low maintenance cost. Copy free upon request.

Hunt Air and Hydraulic Valve Catalog 1 M. This catalog, issued by C. B. Hunt and Son's Company, Salem, Ohio, includes not only revisions and additions to the Hunt air control line, but also a new section devoted to this company's new line of hydraulic valves for 1000 and 2000 lbs. working pressure and for 3500 and 5000 lbs. working pressure. Complete physical data and engineering data are given for the benefit of the user. A unique feature of the hydraulic section is the inclusion of integrated tables on piston displacements, rate of piston displacement, and velocities through valves and piping. The catalog, which is standard 8½x11-in. size, has an attractive cellophane cover. Copy free upon request.



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Baldwin-Duckworth C. P. S. Bulletin No. 61. The features and advantages of Baldwin-Duckworth Continuous Plane Surface Conveyor Chain are outlined in a folder issued by Baldwin-Duckworth Chain Corporation, Springfield, Mass. Specifications covering dimensions, list prices, material description, and sprocket diameters are given. Copy free upon request.

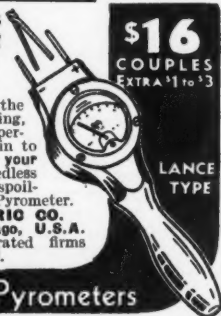
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Fostoria Handbook of Localized Lighting, now being distributed by The Fostoria Pressed Steel Corporation, Fostoria, Ohio, presents information on the following subjects: Good Lighting Practice, Selection of Supplementary Lighting Units, Standard Fostoria Supporting Arms, Standard Fostoria Reflector Assemblies, Efficiency Comparison Charts for Fostoria Reflector Assemblies, Standard Fostoria Base Attachments, Fostoria Complete Lighting Units, and Fostoria Localite Accessories and Parts. The booklet contains illustrations of the various types of Fostoria Lighting Units for use in industry, and lists specifications for these units. Copy free upon request.

Firhite Standard Tools, Bits and Tips. This 16-page folder, comprising specifications and price lists for Firhite Standard Tools, Bits and Tips, contains views of many different Standard Firhite Tip designs and Standard Firhite Tools. It also shows a number of interesting Non-Standard Firhite Tools and Tips. The folder is profusely illustrated by engineering drawings and includes such information as the recommended symbols used in specifying rakes, angles, clearances, radii, right and left hand single pointed tools, and so on. The folder should be useful to all users of Sintered Carbide Tools. Copy free upon request to Firth-Sterling Steel Company, McKeesport, Pennsylvania.

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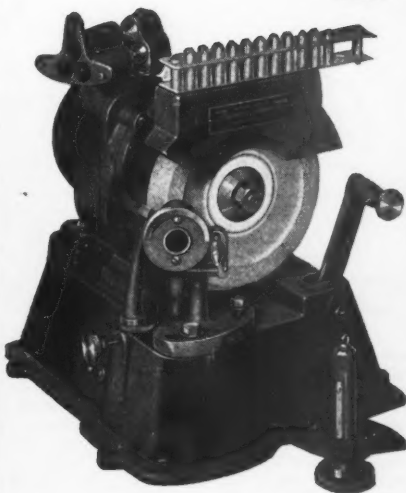
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How To Make Your Own Carboloy Tools. Carboloy Company, Inc., manufacturers of Carboloy cemented carbide tools, dies and wheel dressers, has recently issued an illustrated booklet, designated as T-37, describing in detail a process by which Carboloy users can make Carboloy-tipped tools in their own plants. This booklet includes the following information: Selection and preparation of shanks; selection of proper tip and braze media; preparation, cleaning and assembling of tip; torch and furnace-

brazing procedures including suggestions and furnace specifications; illustrations of typical Carboloy tools now being made in the plants of users by this method, and other suggested tool designs. An insert showing the 152 Carboloy standard blanks and prices is included.

Users and prospective users of Carboloy cemented carbides will find this booklet an excellent guide in making their own tools. Copies free upon request to Carboloy Company, Inc., 2975 East Jefferson Avenue, Detroit, Michigan.

Norton Multipurpose Grinding Machine. Versatility, simple set-ups and convenient controls, which are the outstanding features of the Norton Multipurpose, are presented through the use of descriptions and installation photographs in a four-page folder issued by the Norton Company, Worcester, Mass. Details of construction and operation of the universal headstock, universal grinding wheel head, and quick-acting, lever-operated footstock are also included. Copy free upon request.

Link-Belt Book No. 1532. A 16-page illustrated list-price catalog on friction clutches, known as the No. 1532, has been completed by Link-Belt Company, 307 N. Michigan Ave., Chicago, Ill., and is now available for distribution. Besides giving sizes, dimensions, weights, horsepower ratings, and other pertinent tabular data on both Meeseco and Twyncome types of clutches, the book devotes two pages on the subject of how to select and order the right clutch for the service. To obtain a copy, address the Link-Belt Company, as above, or the nearest Link-Belt office, asking for Book No. 1532.

Whitney Roller Chain Catalog V-125.

Approximately 100 pages of descriptions, illustrations and specifications covering the line of roller chains and sprockets made by The Whitney Chain & Mfg. Co., Hartford, Conn., are included in this catalog. A chain and driving sprocket selection table, roller chain length table, and other information of value in the selection of this type of equipment are also given, although the book is intended primarily as a price list and reference book on Whitney stock and made-to-order sprockets.

Copy free upon request.

Horizontal Napier Band Saw Machines for Modern Metal Cutting are featured in a folder which has been issued by Metal Saw & Machine Co., Inc., 40 Napier St., Springfield, Mass. According to the manufacturer, these band saw machines will cut everything from white metal to high speed steel, and from $\frac{1}{2}$ -in. tubing to a 10x10-in. I-beam. The Model "B" and Model "L" machines are illustrated by means of labeled photographs which indicate the various parts of the units. Specifications and descriptions are given.

The folder also includes illustrations and specifications for band saws for metal cutting cut to length and electrically welded.



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